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PACIFIC FISHERMAN

November 1957

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The Fisheries of Peru

New Forces in a World Industry

What Do They Mean to You?

PACIFIC FISHERMAN

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Vol. 55 No. 12

An Editorial Research Report—

The Fisheries of Peru

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PACIFIC Fisherman's NEWS

NOVEMBER
1957

Three Nation's Scientists Study Each Other's Hands

• Scientists of the North Pacific Fisheries Treaty Nations laid their 1957 researches face-up on the table in Vancouver, B.C., at the end of October, opening the two-weeks meeting of the annual three-nation conference on Pacific oceanic conservation.

As this issue went to press late in the first week, the Biology and Research Committee was preparing its analysis and report on the significance and implications of the year's scientific results as they bear upon the International Commission's prime problem:

What line or lines best separate in the sea, stocks of salmon of Asian origin from those of American origin?

• From the standpoint of revealed results, the United States research commanded primary attention on the basis of its indications that present high seas fishing operations are drawing heavily upon stocks of Red Salmon of American origin.

These investigations, as indicated earlier by the American Section, showed:

1. *By Tagging* that no Red salmon tagged by U. S. researchers had ever been returned from areas other than (a) the ocean fishery in the immediate vicinity of tagging; (b) Alaska streams.

2. *By Racial Studies* based on salmon body structure, measurements, scales, blood type, and associated organisms that science could distinguish at sea between salmon of Asian and American origin.

• Canadian researchers, particularly those in the field of associated organisms, tended to corroborate American findings.

Japan's scientists reported more particularly upon the character and extent of their 1957 activities than on the data gathered and the results obtained.

• Biology and Research Committee for the United States was composed of Commissioner J. H. Clawson, Dr. W. F. Thompson, and Dr. A. L. Tester, the latter replacing Dr. L. A. Walford, whom he is expected also to succeed as chief of biological research of the Bureau of Commercial Fisheries.

Mr. Clawson was general chairman of the committee; and Dr. A. W. H. Needler of Canada was scientific convener, continuing the precedent that this leader of research discussion should be a scientist of the host country.

Union Rivalry, Price Disputes Deadlock Sardine Industry

Southern California's sardine fleet, which has been tied up by union rivalry and price disputes since September 1st, appeared to be freeing itself of the deadlock as *Pacific Fisherman* went to press.

After San Pedro fishermen and members of the Fishermen's Cooperative Association, a boat owners' group met on October 23rd for a public discussion of the tie-up, John Royal, secretary of the ILWU, Local 33, stated that his union's executive committee would recommend to union members that the ILWU drop its price demands from $80 to $60 per ton for sardines and from $55 to $45 per ton for mackerel.

This recommendation was being made, said Mr. Royal, to show that the ILWU wished to end the tie-up. He added that the union's offer must be accepted within several days. If not accepted, the ILWU would return to its original demands.

Also on October 23rd, in a telegram to the director of litigations for the FTC, Mr. Royal stated: "Fishing is tied up in San Pedro harbor as a result of a conspiracy to control prices between certain canners and officials of the Cannery Workers Union and purported officials of the AFL Seine and Line Fishermen's Union. A request is made for immediate action."

(Continued on page 3)

Enormous Power Project Eases Threat to Salmon

The fantastic half-billion-dollar hydro-electric power project proposed for the Peace River in northern British Columbia was hailed by the Canadian salmon industry as a development of immense importance to the future of the fisheries as well as all other aspects of British Columbia's industry.

With capacity running into the millions of horsepower, and the prospect that power could be produced within a comparatively short time, the Wenner-Gren proposal was expected to make unnecessary, if not uneconomic, damming of the Fraser River with its inevitable adverse effect upon the immensely valuable salmon runs of that system.

As it would utilize the Peace River, flowing into the Arctic drainage, the Wenner-Gren project would have no effect upon the Pacific salmon.

Good Albacore Fishing Persists in October

Productive Albacore fishing was found through much of October in an area off the California and Southern Oregon coast north from the latitude of Eureka, where most of the catches were landed.

A number of vessels delivered their catches direct to Astoria up to the middle of October, with individual catches running up to 14 tons.

Blocks and Drums Cleared For S. E. Alaska in 1958

• Relaxation in part of the stringent restrictions on salmon fishing in Southeast Alaska is proposed by the Bureau of Commercial Fisheries for 1958, the concessions to include:

1. Permission for use of power blocks and drum seines;

2. Reduction in sanctuary areas where escapement will not be endangered;

3. Allowance of a 10% increase in combined effectiveness of traps.

In announcing the relaxation, the Alaska Fishery Administrator said: "Some optimism can be felt for a normal abundance of Pinks in 1958." Severe restrictions were imposed on Southeast Alaska fishing in 1955 for a two-year period, but in 1957 it was extended one year because of the poor run expected.

Although relatively good escapement was secured in 1957, the effect of the extremely dry weather and low stream levels cannot be fully appraised.

• The Bureau is proposing a rule that no gillnet may extend more than two-thirds of the width of any channel, even though it may be of legal length for the district.

Kodiak area generally is proposed to open July 7, closing early August 9 to protect the late Pink runs.

In Outer Cook Inlet there will be only one week of Pink fishing, July 28 to August 2. South Central and Southern Cook Inlet fall season will be extended uniformly to run from August 18 to September 20 to permit greater utilization of Silvers.

Chignik trap suspension and closure of the Chignik River mouth will continue as in 1957.

Prince William Sound closing will be determined by a gear-intensity timetable, with traps expected to be included with seines in determining intensity.

• Southeast Alaska herring quota continuance at 22,500 tons (180,000 bbls.) is proposed, with a maximum of 6,250 tons for the Sitka area. The season will open June 15, when fish are expected to be of better quality. An additional quota of 10,000 tons is established for the Sumner and Clarence Strait and South Prince of Wales and Southern districts combined. This area opens June 1.

Forecast for 1958 herring fishing in the principal area around Chatham Strait and Baranof Island is for "a somewhat decreased supply."

Alaska Fall Fishing Saves '57 from Cellar

• Fall fishing pulled the 1957 Alaska salmon season out of the all-time cellar by a narrow margin, but the season's total of 2,448,924 cases remains painfully slender.

Of the total, the fall fishing added 156,661 cases, of which 123,831 cases were Chums and 31,564 Silvers.

In 1955 the fall fishing added only 68,448 cases.

The 1957 production exceeded the all-time low record of 1955 by only 61,786 cases.

The fact that these two years are so close together—with 1956 only a little better — emphasized brutally the low level to which Alaska salmon production has fallen.

Final figures for the year show the Alaska pack in full cases as: Kings, 46,230; Reds, 746,996; Pinks, 736,096; Chums, 828,695; Cohoes, 90,907.

These figures do not include fish canned from salmon frozen in Alaskan waters and transported to Puget Sound for packing.

B. C. Packers Acquires Peruvian Fishery Interests

Canada's biggest fish packing company has become a factor in the fisheries of Peru.

R. E. Walker, president of British Columbia Packers, Ltd., Vancouver, B. C., announces that his organization has acquired interest in plants in Chimbote, Supe and Huarmey.

Decision to move into South America, Mr. Walker told *Pacific Fisherman*, was based on a recognition of the rising importance of Peruvian fisheries as confirmed by a recent extensive survey made in the company's behalf by Ken F. Fraser, vice president, production.

B. C. Packers, Ltd., entered the Peruvian fisheries field through Empresa Pesquera Peru S.A., headed by Carl Hedreen, a pioneer of the industry in that country, who continues as president of hte company. For a number of years his company has operated the cannery at Supe, with interests also at Huarmey and Chimbote, where 10-ton reduction plants were being installed this fall.

Peruvian Feature Upsets PF's Traditional Make-up

Unusual make-up of this number of *Pacific Fisherman* and *Pacific Fisherman's News* was necessitated by the devotion of virtually this entire issue to *The Fisheries of Peru*, the most extensive editorial report on a single subject published by this journal in its 54 years of serving the Pacific fisheries.

We'll be back in our usual form next month.

Japan's 1957 Red Pack Hits All-Time High

• Record production of canned Red salmon was racked up by the Japanese during 1957 with a total full-case production of 1,061,307 cases of this species.

Canned salmon pack, all varieties, stood at 2,423,723 cases in preliminary figures October 20. The only larger packs in Japanese history were before the war when operations were largely conducted ashore in Kamchatka. Record pack was that of 1937 with 2,524,318 cases, including 1,004,864 cases of Reds; followed by 1938 with 2,438,289 cases total, including 1,008,684 cases of Reds.

The 1957 pack by species, basis of preliminary figures to Oct. 20, was: Red, 1,061,307 cases; Pink, 1,112,608; Chum, 198,777; Silver, 11,925; King and Tidbit, 39,106; Total, 2,423,723.

Pack in 1956, final official figures, was: Red, 520,111; Pink, 781,282; Chum, 494,943; Silver, 175,001; King, etc., 40,312; Total, 2,011,649 cases.

All figures include with the high seas pack production of Japanese land canneries from fish landed directly as well as frozen fish delivered from the high seas operations.

Whale of an Idea Features Fish Parade

San Francisco's 1957 Fish Parade, sparked and piloted by Neil Taylor of Norfish Sales Co., turned out to be a triumph—the biggest thing in parades since Portola discovered San Francisco Bay—a real whale.

A live one? No, he was dead, but recently so; and provided for the occasion by "Gib" Hunter of Hunter & Foland, whaling for the Del Monte Fishing Co. of Richmond.

Riding a big truck along Market Street, with a bevy of bathing girl glamor in fish net costumes, the whale commanded attention and publicity for the fish business which couldn't have been bought for his weight in gold dust.

U. S. Tuna Catch Runs Behind; Auction Bids Holding Up Well

With deliveries of American tuna Southern California ports to mid-ctober running 11,000 tons behind e first 9.5 months of 1956, bidding the American Tunaboat Associa-n tuna auction in San Diego indi-ted that U. S. tuna prices were hold-g their own in what is coming to be cognized as a world market.

Bidding in October ranged upward much as $5 per ton above the AFL-O unions' asking price for Yellow-, and down as much as $10 be-w the $270 asking price. Moreover, packers continued to show a disposition to pay higher prices for fish running above certain minimums. Thus fish of the sizes producing best recovery per ton earned a premium; while those in the high-waste sizes suffered an economic penalty.

Last bid before presstime of this issue of *Pacific Fisherman* saw California Marine Curing & Packing Co. paying $270 and $230, the unions' asking prices, to take the *Southern Pacific's* fare.

una Boat Owners uarantee Price Scale

After a lengthy tie-up pending set-ement of tuna prices, San Diego's na fleet in late October began sail-g at the rate of five clippers per y. Before settlement of the price spute more than 100 boats lay idle port.

Crewmen and engineers, dissatisfied ith auction prices, refused to sail less they were guaranteed shares sed on $270 for Skipjack and $230 r Yellowfin. Just before press time dividual boat owners, eager to re-me fishing after long idleness due rst to unloading difficulties then to ice disagreement, guaranteed crew-en $270 and $230.

If auction prices upon their return port are less, owners will make up e difference to crews. If prices are eater, owners and crews will share e difference at the established rate 48.13% for the crew and the re-ainder for the owner.

Earlier, Westgate-California Tuna acking Co. and Star-Kist Foods, Inc. ad guaranteed these prices in order keep their fleets fishing.

At this writing San Diego's purse ine and sardine fleets remain tied up nding outcome of an AFL-CIO and WU union dispute.

apan Sells 200,000 ed Halves to Canada

Sale of 200,000 cases of 48 Red mon halves to British Columbia yers at $14.90, fob. Japan, was re-rted in Tokyo October 21. This ice represents a reduction of 75c r carton from the nominal list price $15.65, and is a compromise be-een the ask-and-bid prices which ought negotiations to the breaking int the middle of October.

A lesser quantity of Red quarters, cked 96 to the case, was also pur-ased by Canadian buyers at $18.28). Japan.

Puget Herring Area Quota 15,000 Tons

With an initial quota of 15,000 tons for processing of any kind— reduction, canning, curing or preparation for bait — Washington waters along the international boundary in Haro and Georgia Strait were opened this fall to fishing from October 1 to February 5.

The season corresponds with that of Canada in contiguous waters, from which the Canadian fishermen make an average catch of around 40,000 tons. In announcing the new regulations, Milo Moore, Washington director of fisheries, pointed out that the American fishermen now would be able to utilize take a portion of the total resource; and that the action followed a series of public hearings at which virtually unanimous support of the proposal had been voiced.

First plant to announce operations based upon the opening of the herring area to reduction fishing was that of Skagit Fisheries, Inc., at Anacortes, which will operate in an arrangement under which it will be supplied with fish caught by three of the large herring seiners of the Oceanic Fisheries Company's Alaska fleet.

New Fish Commissioners Named For Oregon

First complete change in the Oregon Fish Commission in more than 30 years occurred in October when Governor Robert Holmes accepted the resignation of John C. Veatch, chairman; Robert L. Jones and O. H. Hinsdale. Mr. Veatch had been a commissioner continuously since the mid-Twenties, serving under numerous governors of both parties.

Newly appointed commissioners are: Harold T. Johnson, Astoria attorney; Charles W. Mahaffy, Coos Bay dairyman; Omar C. Palmer, Portland insuranceman.

Sardine Industry

(Continued from page 1)

Earlier, on October 15th, fourteen members of the AFL-CIO union obtained a temporary restraining order against their own union to prevent its officers from performing certain duties, altering records or threatening or intimidating any union members or forcing them to work under a wage scale adopted at a union meeting on October 10th ($55 per ton for sardines).

On October 21st these fourteen dissident AFL-CIO members themselves were placed under a restraining order to prevent their posing as official union representatives, committee members or pickets of the AFL union, from unlawful interference in union affairs and business, and from any physical violence or threats against any union officers or their families.

Britain Buys Jellied Tuna from Japanese

Jellied tuna to the extent of 40,000 cases is reported in Japan to have been sold through Wilbur-Ellis Co. (Japan) Ltd. to Pelling, Stanlev & Green, Liverpool and London, the firm holding the major portion of the British tuna import license. The specialty was packed by Yamamoto Shokuryo.

Trading involving 52,000 cases of tuna in oil is also reported between the Wilbur-Ellis and Pelling, Stanley houses.

Harry Tallman Leaves Seldovia Bay Company

"It is with regret that Whitney & Co. announces the termination Nov. 30 of Harry Tallman as vice-president and superintendent of the Seldovia Bay Packing Co.", Sam Rubinstein, president, reported to this journal shortly before presstime.

"This change is due to a re-organization of the Seldovia Bav Packing Co. and its affiliated firms," went on Mr. Rubenstein. "Mr. Tallman has been associated with our company and with the salmon industry for a good many years, and we are sure his many friends join with us in wishing him the best of health and prosperity for the future."

635 Whales Killed in 1957 Canadian Operation

Whaling by British Columbia Packers' six-killer fleet operating to supply its whaling station at Coal Harbour, Vancouver Island, produced 635 whales during the 1957 season, which ran from April through September.

This contrasted with 376 whales killed in the shorter 1956 season.

Species count of the 1957 kill showed: Blue, 16; Finback, 283; Humpback, 49; Sei, 96; Sperm, 191.

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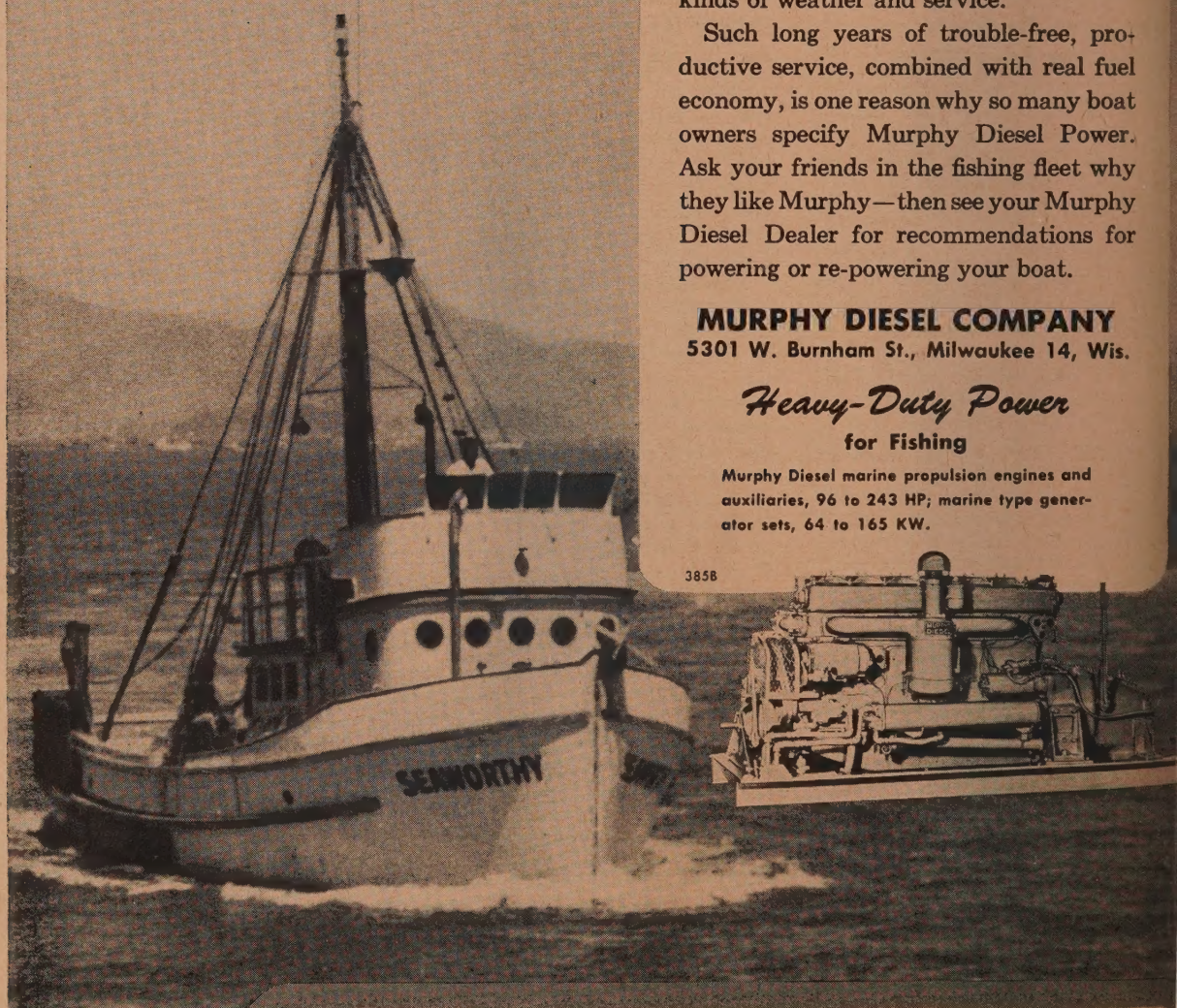

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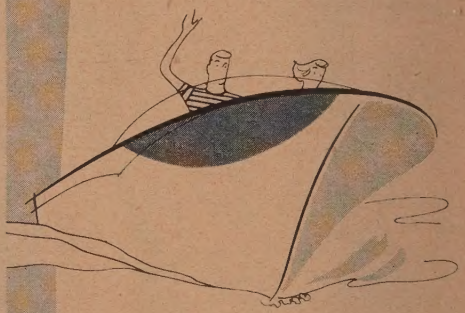

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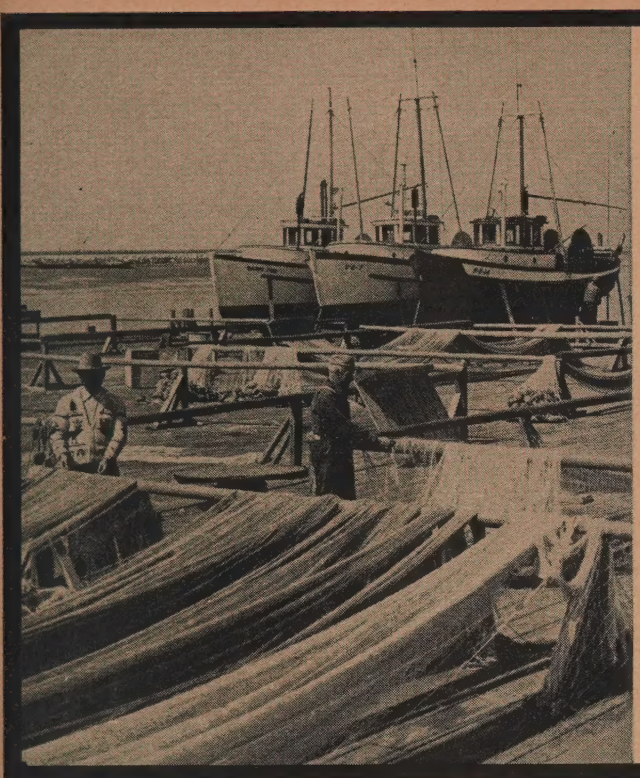

Vancouver, B. C. Fisheries report:

more Chrysler Marine Engines in use than all other makes combined

NELSON BROS. FISHERIES, LTD. wharf and nets with three Chrysler-powered gill net boats in the background.

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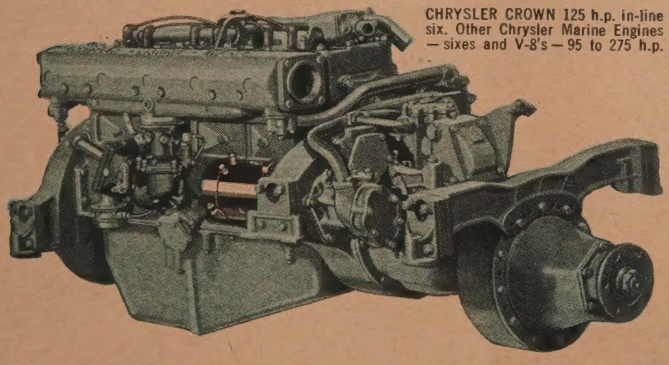

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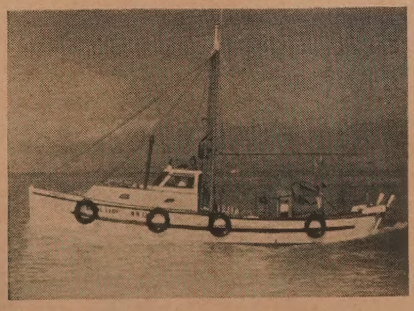

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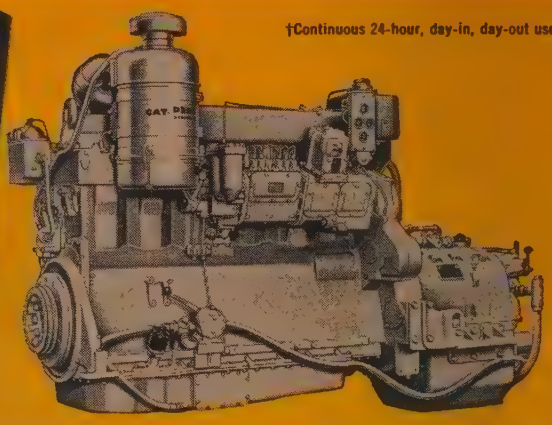
New D353 (Series C) **290 HP†**

†Continuous 24-hour, day-in, day-out use



To provide an even wider choice of modern heavy-duty marine diesels to meet your requirements, Caterpillar has added the D353 to its line. Like other dependable, honestly rated CAT* Engines, the D353 incorporates in its design the advanced features developed by Caterpillar in a quarter century of diesel leadership. Its four-cycle design delivers the long, effective power stroke that puts power to more efficient use than other types of engines. Its fuel system requires no adjusting. There are no cylinder ports to clean. It operates on a wide range of fuels including premium diesel fuels as well as low-cost No. 2 furnace oil *without fouling*. And it's ruggedly built to run without tinkering during a long life of low-cost operation.

Whether you're powering a new boat or repowering an old one, it will be well worth your while to look into the advantages of Cat Marine Diesels, which range up to 500 HP (continuous duty). Marine electric sets range up to 350 KW (continuous duty).

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Through the years, Caterpillar Marine Engines have earned a reputation for *honestly rated power*. Now Caterpillar backs this reputation with a *notarized certificate* covering the horsepower capabilities of each engine. You have a right to demand *certified power* when you invest in an engine. You get it when you buy from a Caterpillar Dealer!

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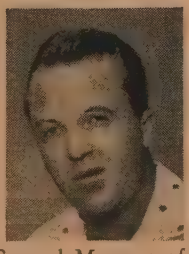
Less weight...less work...more fish



"By using B. F. Goodrich plastic seine floats, we saved ⅓ of the number of floats and at least 40% in dead weight on the nets," says Mr. James K. Walker, Vice President and General Manager of F. B. Walker and Company, Pascagoula, Mississippi.

"The weight-saving factors are the smaller quantities, 2,200 B. F. Goodrich floats instead of 3,500; the 25% less weight of each float and that B. F. Goodrich floats never become water-logged in use.

"The water absorbent property of cork floats had been especially troublesome. The weight of the fish in the net would drag the water-logged floats under the surface, allowing a good part of the catch to escape. Then, too, the crew had to work all the harder because of the added weight of the water-logged floats.

"In our pre-B. F. Goodrich days, we had to install a completely new set of 3,500 cork floats while the old ones dried out during an entire season. B. F. Goodrich floats, on the contrary, can be transferred immediately, their buoyancy unimpaired even after three seasons' use. And since there are only 2,200 floats, the transferring is much faster.

"There is also labor and time savings since B. F. Goodrich floats are changed so infrequently and no inventory control has to be kept of a large stock of drying cork floats. The extra cost of the B. F. Goodrich floats is more than amply repaid by the savings in replacement costs alone."

Whether you purse seine or not, your fishing operation can be more efficient, more economical with B. F. Goodrich plastic seine floats. For more information write B. F. Goodrich Sponge Products, a division of The B. F. Goodrich Company, 345 Derby Place, Shelton, Connecticut.

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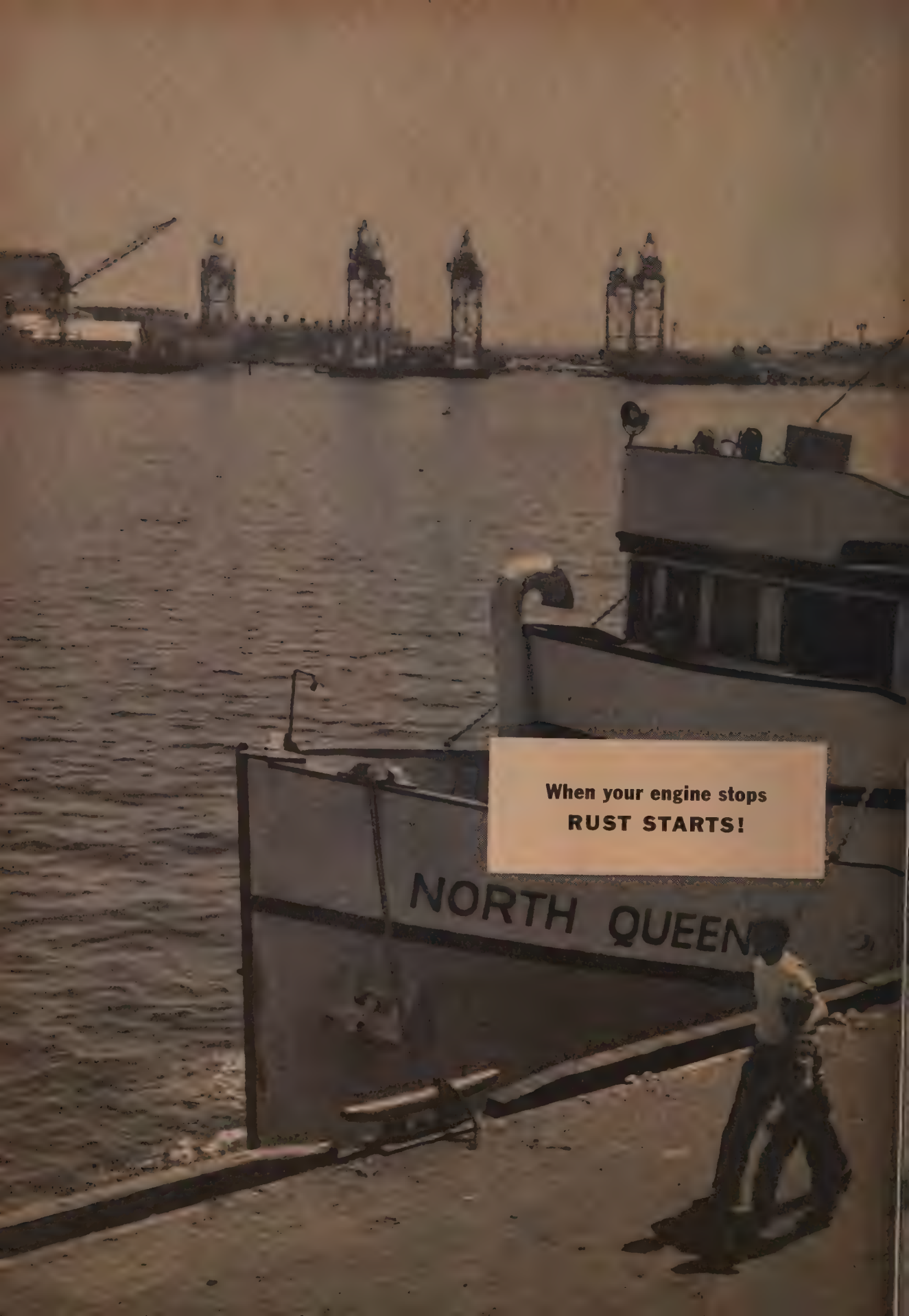
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NEW TYDOL HD KEEPS ON WORKING WHEN YOUR ENGINE'S OFF!

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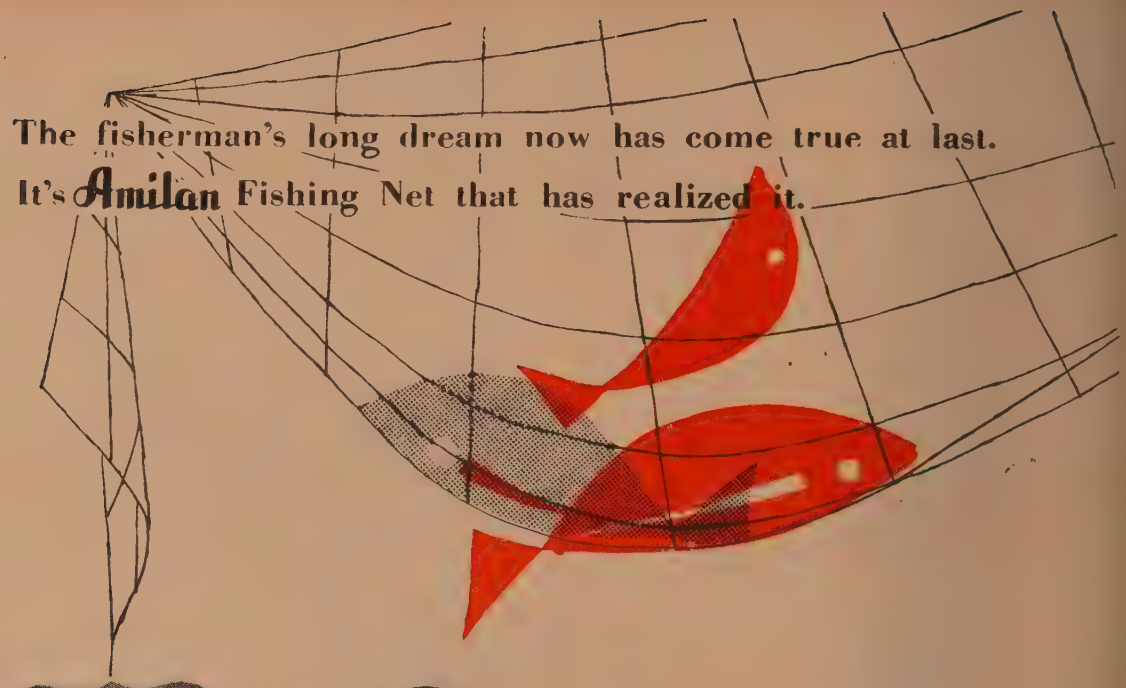

The fisherman's long dream now has come true at last.
It's Amilan Fishing Net that has realized it.

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Amilan
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Because:

1. It brings you larger catches than conventional types of net, particularly in the case of an Amilan gill net.
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4. It does not easily decay. Its life is semi-permanent.
5. No drying or preservative is required. Expenses and labor for drying and treatment are saved. Spare nets are almost unnecessary.
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The world's highest workmanship plus these unique merits is the world famous "Amilan" Fishing Net. It always carries the label shown above. "Amilan" is the trade mark of our nylon. Toyo Rayon Co., Ltd., Du Pont's exclusive licensee in Japan on nylon production.

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Exploding into the air, a pheasant becomes a lightning streak of brilliant feathers...wings drumming...flying fast. You've only a split second to bag him. Likewise, your packaging has only seconds to bag customers...stop their eyes... compel them to buy. Fibreboard keeps packaging on target. Aims your shipping cases and cartons right at fast-moving customers. Let your near-by Fibreboard representative guide you to a limit of sales through better packaging.

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From plants along both coasts, Fibreboard has long served the fishing industry. From Alaska to Mexico, New England to Florida, and along the Gulf. In addition to supplying shipping cases and cartons for canned fish, Fibreboard has pioneered in the research, design, and creation of special containers for fresh fish, frozen fish, shellfish, and other sea food delicacies. Containers that enable new methods of packing, transporting, and marketing. With less cost to pack, less cost to ship, less damage to product. Therefore, more profit to you. Could our experience and individual service help you? Our sales representative will be happy to consult with you.

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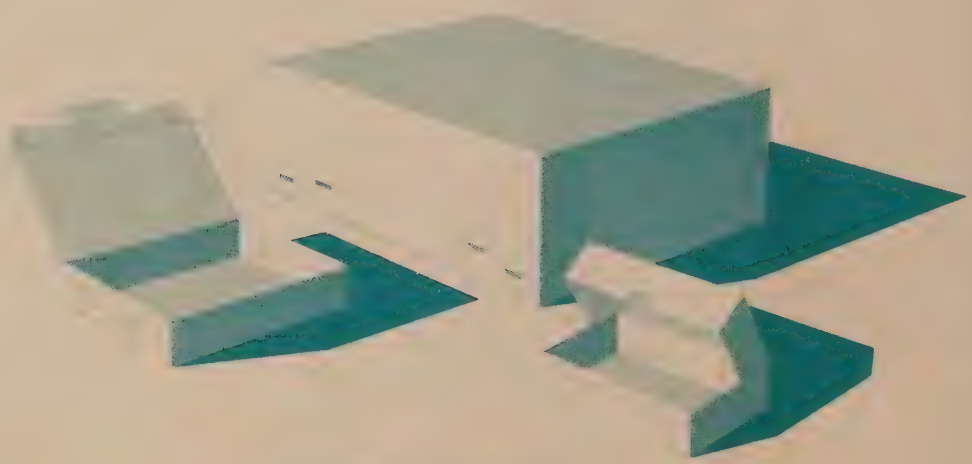

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Leading Tuna-Boat Skipper Reports:

"Strength and Light Weight of Nylon Nets Mean Faster Handling"

"In tuna seining, rapid handling means important savings," says Capt. Anton Misetich of San Pedro, well-known skipper of the tuna boat *Anthony M.* "Our 2,400-foot net of Du Pont nylon handles so efficiently that fewer sets are needed to fill the boat; more trips can be made to the fishing grounds. And judging by the net's excellent condition after 14 months' hard service, we're confident it will outlast any net we've had and prove far more economical in the long run."

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"The best service I've been able to get from ordinary float lines is one year," says Captain Misetich. "Four years ago, I bought a nylon line. I'm *still* using it—and expect another three years' use."

Only nylon netting and rope offer you both better performance and important savings in over-all cost. And you can depend on your reliable American net manufacturer to combine finest quality Du Pont nylon with the most skilled craftsmanship.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

NYLON NETTING—easier to handle, wet or dry . . .
resists rot and mildew . . . more economical in the long run

The Fisheries of Peru

New Forces in a World Industry

• Research and writing of many weeks on a single broad subject—The Fisheries of Peru, New Forces in a world Industry—culminate in this special number of *Pacific Fisherman*.

For the first time in its 54 years of industrial publishing, this journal devotes a complete issue to a report on and analysis of one subject.

To us the Fisheries of Peru seem so broad a subject, so important, so little understood, so pregnant with possibilities for the future that a new, full editorial approach is mandatory.

Remarkable rise of Peru's industrial fisheries in a period of 12 years discloses energy, daring, business ability and economic soundness. It proves also the bewildering abundance of fish in the cold waters of the Peruvian Current.

Because the fishery potential of Peru has barely been glimpsed; because it will affect the economy of that country and the entire Western Hemisphere; because it will mean something to every facet in the world's fisheries, *Pacific Fisherman* accepted the responsibility of researching this resource and reporting on it to our readership.

In doing so it has been our objective not only to acquaint the world's fishing industry with the lusty story of its segment in Peru, but also to provide a source book of Peruvian fishery fact.

The story has some amazing aspects, as those fisheries have amazing promise.

• The editorial enterprise of which this Peruvian number is the fruit is an expression of this journal's concept of its responsibility, for after all, this is *Pacific Fisherman*, with all the industrial fisheries of all the Pacific as its field. As they expand and develop, this journal's coverage expands with them. As they may reach into other ocean basins, their journal's interest and coverage goes with them; just as it goes into the world markets where they sell their goods.

In this issue devoted to The Fisheries of Peru *Pacific Fisherman* gives new emphasis to its broadened sphere, just as it does to the development of a great South American fishery in equatorial waters.

Pacific America, North and South; Asia, Australasia, Africa, Oceania, their fisheries, and the markets where they sell — all this is the field of *Pacific Fisherman* today.

• From one of the far, rich areas of that field this journal is proud to bring to its readers this report and analysis:

The Fisheries of Peru—New Forces in a World Industry.

And to raise the question for all who read, for all who fish, for all who process, and for all who sell:

What do they mean to you?

- PERU -

EPISA at Ilo, first of the modern fishpacking plants on the Peruvian coast, and still rated as the largest producer of canned bonito. Employe quarters in the foreground; then the main cannery building, with the freezer, cold storage and power plant. Reduction plant is at the right.

Chapter II.

Challenge and Invitation

• Peru's industrial fisheries stand today in the bright light of world interest.

It is a position won by the speed with which they have attained stature, rather than the magnitude thereof; and through the almost endless possibilities for the future which the experience of a decade has disclosed.

These fisheries of Peru win the attention and interest not alone of the world's fishermen and packers, but of the world's business broadly—for their dramatic rise is a classic of commerce in the years since World War II.

Moreover, it is a drama of individual initiative, of private enterprise, of a natural resource developed for the economic benefit of a nation by that nation's businessmen, aided by the investment of money and technological know-how by businessmen of other countries.

No subsidy here; no government operation; no price supports; no price controls.

It has all come about since 1945.

In those 12 years a resource of enormous extent has been blocked-out in the moving masses of the sea—and that with the prospecting scarcely begun, hardly extended seaward beyond sight of land.

Plants have been built, technologies applied to tropical conditions, and goods meeting the highest standards of quality produced.

Markets have been created overseas, where Peruvian foods have never sold before, but which in some cases pay premium prices for them today.

These things have been brought about by private enterprise, engaged in for profit. They have transpired in South America during a decade which, considering the continent as a whole, has been marked by social and political turmoil and economic virtigo. They result from the awareness of Peruvians today, awareness amplified and liberated by socio-economic thinking which makes *doctrine* of free enterprise and individualism.

This is given reflection in the extent to which "Empresa"—"Enterprise"—is a component in the names of Peruvian fishery companies.

• Other editors have sensed the soundness in Peru. Writing in *Fortune* for November, 1956, under the title "Why Peru Pulls Dollars", John Davenport says:

"What has particularly attracted the modern businessman and what makes Peru unique among South American nations is that its government has adopted policies designed to encourage both domestic and foreign capital, and has seen that investment, with all its vital byproducts of health, education and housing, is a friend, not an enemy . . . Peru has adhered to the South American version of the Open Door; and today a dollar earned in Peru is virtually as good as a dollar earned in the United States." Mr. Davenport goes on in a vein which states the situation with singular clarity:

"Peru represents an extraordinary success in giving the forces of domestic and foreign capitalism their head. In the process Peru has not be-

Peruvian fishermen have taken readily and intelligently to modern equipment and fishing methods in the dozen years since industrialization came to the rich fisheries of their ancient land.

come a rich country overnight, but it has made economic progress. It has also held up a standard in international economic conduct to which far richer nations, and more fortunately endowed nations, might repair."

• If they are so rich, why were the fisheries of Peru so long passed by?

Peru is an ancient country, where men beyond the day of history quarried and shaped enormous stones without steel, carried them without wheels, and with them built incredible buildings amongst incredible mountains. Did they not fish? Scarcely.

And the Spaniards who conquered the land under Pizzaro in 1535; *they* came from a fishing people. Did they not fish in Peru? Apparently not at all. They established the first university in the New World in 1541, a long lifetime before Plymouth; but they built no fishery.

For more than 400 years the rich resources of the sea went almost unused. For centuries the enormous deposits of guano on the coastal islands of Peru amazed mariners, but no one seemed to realize their implication—a fishery resource of fantastic extent.

Charles Darwin passed this way on the voyage of the "Beagle" which was to shape Man's concept of the Science of Life.

Alexander von Humboldt was here also; and other able, less known, explorers, naturalists, scientists.

True, whalers came and killed the sperms; cooked them down, and carried the oil back to New Bedford—but the richer resource, on which the whales lived, went undeveloped until a dozen years ago.

• Now Peru has an industrial fishery which gives her stature among the fishing nations and protein-producers of the world.

She has travelled far in a few years upon the sea. How far may she go with this resource in the future?

Man sees into the future only through faith; but faith can be built upon facts, and these are abundant and plainly to be seen on the coast of Peru.

Let us, then, examine them.

Statistical Tables in this report on The Fisheries of Peru are official data of Peruvian government agencies. We are indebted to C. N. Griffis, publisher of the Peruvian Times, for securing, abstracting and providing this statistical material.

VALUES OF PERUVIAN FISHERY EXPORTS BY COUNTRIES

(Shown in thousands of Soles, equivalent to U. S. $0.0528)

CANNED FISH

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
United States ...	5,696	10,796	16,359	39,131	50,324	54,543	62,093	61,717	92,697	76,049	64,094
Canada	..	935	67	..	..	1,039	2,778	4,251	5,633	4,213	5,115
Switzerland	145	907	536	1,588	4,311	3,543	5,299	4,418	5,910	1,553	510
England	..	..	..	..	..	..	2,730	2,850	36,922	53,558	87,351
Belgium	..	1,316	49	518	1,383	4,049	5,415	6,618	7,330	4,645	3,950
Other	2,242	962	94	1,813	2,483	2,704	6,019	4,320	6,435	9,801	15,552
Total	**8,083**	**14,916**	**17,105**	**43,050**	**58,501**	**65,878**	**84,334**	**84,174**	**154,927**	**149,819**	**176,572**

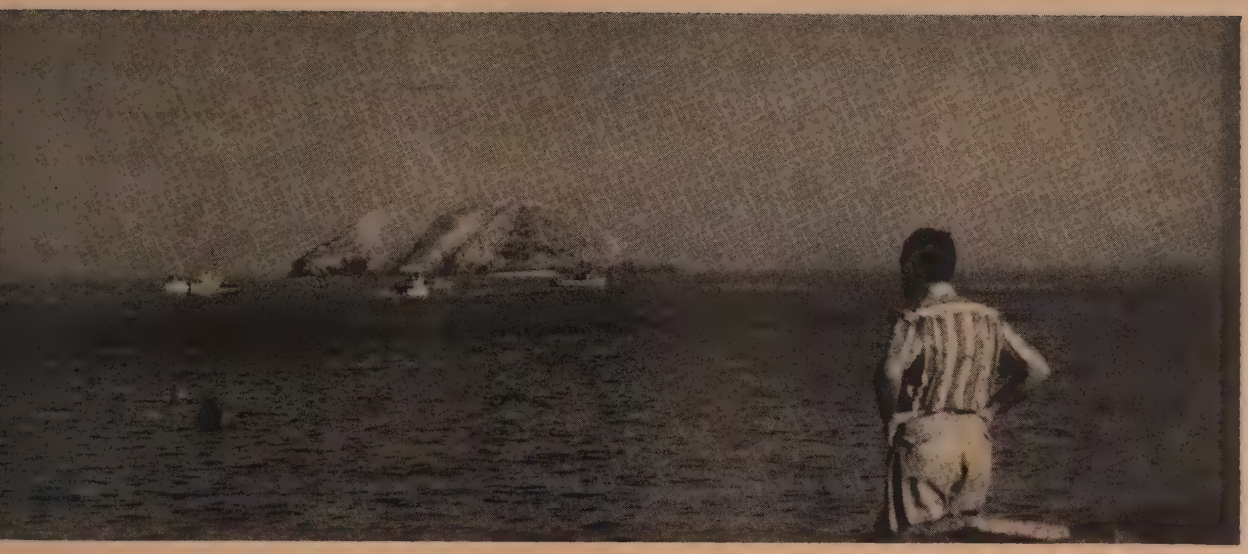
FROZEN FISH

United States ...	..	..	898	6,937	22,762	17,725	23,452	14,787	92,697	35,285	32,584
Other	..	..	..	20	..	465	..	1,934	62,230	2,503	800
Total	..	..	**898**	**6,957**	**22,762**	**18,190**	**23,452**	**16,721**	**154,927**	**37,788**	**33,384**

FISH MEAL

United States ...	..	210	271	2,206	3,909	7,080	12,471	15,514	18,777	16,414	15,667
Other (*)	..	..	..	..	341	2	101	670	3,794	21,496	51,544
Total	..	210	271	2,206	4,250	7,082	12,572	16,184	22,571	37,910	67,211

(*) Mostly Holland and West Germany.



Watching 'Em Fish—Paul Gligo, manager of Coishco operations, stands on the plant pier to watch the fleet working anchovies hard-by, with a guano island in the background.

Chapter III.

Peruvian Fishing

from Inca to Industrialist

• Fish played only a small part in the history of Peru through the Inca and pre-Inca periods, and indeed little more in the Colonial period which followed the Conquest and continued for nearly 300 years.

This is particularly surprising when it is considered that few seas in all the world are so densely populated as those which wash Peru.

It should not be understood that the ancient Peruvians made *no* use of the fish in their sea, for the ruins of their storehouses have produced excellent nets, preserved from prehistoric times by the virtually rainless climate.

Moreover, the pottery huacos of the coastal tribes, particularly the Chimus, who occupied the coast where much of the industry centers today, are found molded in the form of fish, while clay bowls and utensils occasionally are ornamented with fish.

Huacos are pottery jugs with peculiar handles of conventional form. Actually, much of the history of pre-Conquest Peru must be derived from a study of these jugs in their myriad forms and ornamentation, for the Inca Empire and the civilizations which preceded it had no written language and left no literature of any sort.

What we know of these ancient Peruvians comes in large degree from their earthenware. If frequency of occurrence of creatures in the huacos may be taken as index of the part played in the life of the people who made them, then it is plain that fish and fishing played insignificant parts in ancient Peru when contrasted with birds, llamas and vegetable foods.

• Early Spanish writers describing the Inca system of roads and couriers refer to the fact that fast runners carried fresh fish from the sea coast over mountain ranges whose *passes* top 15,000 feet to the table of the Inca, the Sun King, in Cusco. This practice appears to have been limited to the service of the Inca himself, and the evidence indicates that, away from the coast at least, fish was virtually unknown in the diet of the Peruvian people.

Unhappily, this condition has not greatly changed, for though Peru has industrialized fishing today, relatively few fish are used by the people of the country, despite a diet notably deficient in animal proteins.

Through the period of the Conquest and the Colonial centuries, fish was never more than a minor factor in the subsistence regime of the coastal population, which even today comprises only one-third of the Peruvian nation. In the mountains and the high

Miramar cannery at Chimbote is situated on one of the main streets of the city some distance from the waterfront, but has achieved a reputation for high quality, conscientiously maintained.

valleys of the Altoplano — the high plains—fish are almost unknown, despite Point 4 efforts to teach the people to use transplanted trout which thrive in the mountain lakes and streams.

• American whalers provide the sole exception to the virtually complete neglect of the Peruvian fish populations as an industrial resource.

During the Nineteenth Century heyday of whaling, when New Bedford sent her whalers on five-year voyages to all seas of the world, the masters and the boatsteerers and the harpooners learned that there was a peculiar concentration of sperm whales off the coast of Peru, and they fished them hard—too hard, perhaps.

That sperm whale concentration persists today, and modern fishermen tie it to the overlapping abundance in these waters of the Giant Squid, favorite food of the Sperm which, with the Killer, is the only whale capable of eating these great molluscs.

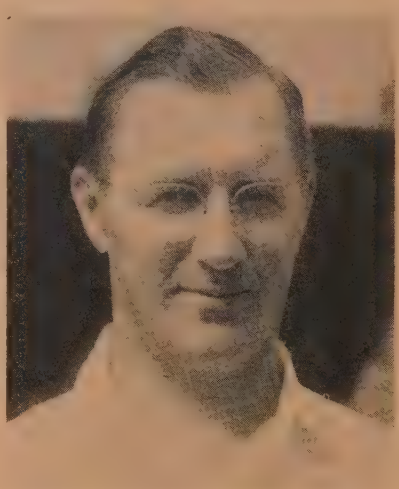
Because the Giant Squids are there, the Sperms are there still, and because of the Sperms there are modern whaling stations in Peru, at Chancay, Pisco and Paita.

• Thinking which stimulated the first actual inquiry into the fishery resources of the sea off the coast of Peru emerged in the late 'Thirties, when thoughtful Peruvians asked that something be done to assess from a human standpoint the extent of the fishery resources and the possibility of utilizing them for the economic benefit of the nation.

It is probable that these suggestions had their genesis in the studies made for the Compania Administradora del Guano, the government monopoly for exploitation of enormous deposits of bird droppings on islands off the coast.

Study of these deposits and of the flocks producing them led inescapably to the conclusion that the annual increment of guano could come only as result of the consumption of millions of tons of fish by tens of millions of birds.

If such numbers of birds could live by fishing, perhaps the human Peruvians of the coastal belt could improve their living and their economy from the same source.



Carl Hedreen, American technologist who in 1944 made the survey on which initiation of industrial development of Peru's fisheries was based. He is now a leading bonito canner and fish meal manufacturer.

At that time the United States had a policy of providing Fishery Research Missions, where requested by other countries which wished to have their fishery resources examined and evaluated. Harkening to the suggestion of some of its thoughtful citizens who felt there were latent possibilities in the sea, the Peruvian government requested such a study and the United States responded with the dispatch of a mission headed by R. H. Fiedler, then chief of the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service. This was in 1941.

Unhappily, this was a year of "El Nino", a natural phenomenon which will be discussed in later pages. When "El Nino" prevails the occurrence and availability of the various species becomes aberrant. Weather is disturbed, occasionally with heavy showers; fishing for bonito and anchovies is poor, and tuna are found south of their normal range. There are many variables.

(Incidentally, 1957 was an El Nino year, with accompanying divergence from the usual pattern.)

Thus the Fiedler Mission, which included beside its chief Norman D. Jarvis, technologist, and Milton J. Lobell, fishery engineer, conducted its studies in a year of abnormal conditions. While note was taken of El Nino, it now is apparent that the mission did not adequately appreciate the degree of departure of the conditions it observed from those normally prevailing. This failure to recognize and to assess properly the aberrant character of an El Nino year stood as a warning to *Pacific Fisherman* in its 1957 study for this edition devoted to the fisheries of Peru.

• The Fiedler Mission found that some 26,000,000 lbs. of fish had been landed on the 1,400 miles of the Peruvian coast in 1940, with Callao receiving 26%, Pisco 11%, Sechura 10% and Pimental 9%.

Some fish was used fresh in the landing ports or shipped to Lima, but salting was virtually the only method of preservation attempted, and this curing was of the most primitive character. The mission noted small canning operations in Lima, Callao and Pisco, packing for local consumption.

While predicting eventual important extension of canning, the mission was inclined to believe that the principal industrial opportunities lay in the development of salt curing.

• The year of the U. S. Fishery Mission to Peru also saw the first move of American enterprise toward the

development of industrial fishing in that country. Whether the mission served as a stimulus is not now apparent.

However, the Van Camp Sea Food Co. of Terminal Island, Calif., moved in 1941 to establish a freezing plant on the coast of Peru to which fishing vessels could deliver tuna catches to be frozen and stored; and subsequently shipped to the United States by coastal reeferships.

Preliminaries of this project were well advanced, and indeed the machinery was on the high seas bound for Peru, when Pearl Harbor plunged the United States into World War II. The Van Camp venture was immediately cancelled.

• Increased supplies of vitamins, and notably Vitamins A and D, were demanded early in World War II. One of the principal American factors in fish oils of all sorts was, and is, the Wilbur-Ellis Company, a trading company of world scope, dealing in many commodities; but which had its beginnings in the field of fish oils and meals, in which it has always remained a leading factor.

Seeking additional supplies of vitamin oils, the Wilbur-Ellis Company established a liver-buying operation in Peru with F. D. Wyatt in charge. From this beginning grew an enterprise which has exerted powerful leverage in lifting the fisheries of Peru to industrial status, and in distributing their products in Europe and North America.

Peruvian Fishery Pioneers—Manuel Elguera, president of Sociedad Nacional de Pesquera, and of a number of fish packing companies, sits on the right, with F. D. Wyatt, general manager of Wilbur-Ellis Peruana S.A. Mr. Wyatt's advocacy of bonito canning in Peru led in 1946 to the initiation of operations by Empresa Pesquera Ilo S. A., headed by Mr. Elguera.

The name of the company will recur frequently throughout this study of the Peruvian fisheries, for it has played —and continues to play—a very large part in that industry.

• Livers of the fish delivered to the Wilbur-Ellis buyers amounted to only 3% of the weight of the fish, on the average. For the fish itself, there was no market, as the most abundant varieties were little esteemed for food by the coastal population. Literally, the fish could not be given away; and large quantities simply were destroyed.

Mr. Wyatt deplored the waste, particularly at a time when the Allies were gravely in need of protein food —and, by the way, Peru had been the first country in South America to enter the war as one of the Allies. He suggested that an effort should be made to preserve for food the fish from which the livers had been taken, and as a result the United States authorities dispatched specialists to Peru. The Fiedler Mission has seen salt curing as the most promising method of preservation for the fish of the area, and this was undertaken. Several thousand tons of bonito, tuna, and other species were salted in barrels and shipped to Puerto Rico and European markets by the War Food Administration and Surplus Commodities Corporation.

Convinced that salting was not the answer, and that the end of the war was very near, Mr. Wyatt proposed that the Wilbur-Ellis Company should examine the fisheries of Peru as undeveloped resources of great latent possibilities for development in the post-war period.

As result of this suggestion, the company in 1944 dispatched Carl Hedreen of its technological staff to the South American coast with instructions to examine it thoroughly and make recommendations as to how development should be undertaken—and *where*. Mr. Hedreen was, and is, a fisheries technologist from the University of Washington, who had served The Canadian Fishing Co., and then had joined the Wilbur-Ellis Co.

The Hedreen Survey extended from the northerly limits of Peru at the Gulf of Guayaquil to Antofagasta in Chile. He recommended the establishment of canneries, integrated with reduction plants and refrigeration facilities, at Ilo, the southern-most pos-

Bonito Gillnetters relaxing in the bay at Supe after their night's fishing. The boats have neither power nor sails and are rowed to sea. Nets are of cotton.

Preparing Loins of bonito in the Gildemeister cannery at Chancay with the finished loins on the conveyor belt, moving to the can-filling section. Workers are paid by the day, but workmanship is checked by inspectors.

sible port on the coast of Peru; at Pisco, about 200 miles down the coast from Callao; and at Chimbote, some 250 miles to the northwest, on what is probably the best harbor in Peru.

Ilo and Chimbote were outstandingly successful choices, but Pisco has never measured up to the early hope held for it, principally because of stiffish winds, strong currents and weather conditions which have handicapped operation of vessels of the size and types which have carried the burden of Peru's fishery production to the present.

• Ilo was the first cannery to be developed—and has since remained the largest producer in Peru.

The development at Ilo introduces another name which will be used often in this industrial analysis, for its bearer in a man of eminence in the fisheries of Peru—Manuel Elguera, president of Empresa Pesquera Ilo S. A., the company formed to build and operate the plant at Ilo. What of the Wilbur-Ellis Company? As a corporation it does not participate in cannery operation in Peru, although it markets the products and by-products of many. Principals of the company do participate in Empresa Pesquera Ilo S. A. as individual investors. Majority interest is Peruvian.

But this is an historical synopsis. Of corporate details, more later.

This was in 1945. Priorities were secured for procurement of cannery equipment in the United States, and the plant was in operation in a limited way by April, 1946. The industrial development of the fisheries of Peru had begun.

Of the pioneers in this venture, which already has come to mean so much, we have noted the names of, F. D. Wyatt, Carl Hedreen and Manuel Elguera.

Mr. Wyatt, who today is manager of all activities of the Wilbur-Ellis Company in Peru, saw the opportunity and urged that it be grasped. Mr. Hedreen bore the technical responsibility of deciding how and where and when. Today he operates his own canning and by-products company, Empresa Pesquera Peru S. A. at Supe.

Mr. Elguera, whose mother was an American, the daughter of a surgeon-general of the United States Army, made industrial beginnings possible financially, politically, and administratively, and thus gave to the economy of his country the stimulus which has come from the further development of its fisheries by many other patriotic Peruvian industrialists. In subsequent years he was to form other operating companies with marked success, and serves as the president of Sociedad Nacional de Pesqueria, the National Fisheries Society of Peru.

John Day, manager of Frigorifico Paita S.A., and all Peruvian operations of Westgate-California Tuna Packing Co. and National Marine Terminal.

• Operations at Ilo launched a wave of plant building which swept the entire coast of Peru. In 1947 and 1948 many plants were built, not all of them wisely located, not all adequately financed, not all with distributing facilities capable of marketing their products to best advantage.

This matter of markets was particularly vital because under the rather sketchy financing of many of the companies any interruption of sales and payments, or any serious decline in selling price, could be crippling.

There followed a few painful years, seemingly inevitable in the swift build-up of fishing operations, whether involving fleet or plants. Reorganizations were inevitable. Some plants closed.

The period of pain came to a close with the development of markets for Peruvian canned bonito in Great Britain and the United States. This is a story in itself, and will be dealt with as such.

Recent years have brought a resumption of growth, on a more studied, better financed, more realistic basis than that of 1947-48. Much of it has involved the manufacture of high quality fish meal and fish oil from anchovies.

With 1957 Peruvian canning found new problems of market, and met competitive challenge for the first time in the United Kingdom, where it had pioneered, developed and almost exclusively supplied a demand for tuna.

Meeting this challenge, and preparing to broaden its market position in the United States, the fishing industry of Peru counts 1957 as the initial year of a new phase in its history.

• It is a year in which tuna is proving plainly that it has become a world commodity, with presently narrow markets—a condition tending to develop critical competitive pressures as goods from many seas seek to sell in the United States and to a limited extent in the United Kingdom.

It is a year of high production; and of growing problems.

Mancora Surf-Riders—On this remote beach every drum of oil, every pound of fish, every man and every net must be run through the surf on balsa rafts, as shown here, or in heavy skiffs.

Chapter IV.

Cold Sea — Dry Land — Hot Sun

• Peru runs from the Equator to 19° South Latitude, a north and south distance of about 1,300 miles. The coastline of the country begins at 3° South and runs irregularly southeasterly for a distance of approximately 1,400 miles.

Almost the entire country lies between the 70th and 80th meridians of West Longitude. Talara and Paita, at the most westerly extremity of the country in the far north, lie directly south of Savannah, Ga.

Ilo, the most southerly and at the same time the most easterly port of Peru, is directly south of Portland, Me.; and actually east of Quebec.

• Dominant physical feature of Peru of course is the great Andean mountain range, roughly paralleling the coast, its divide in few places more than 100 miles from the Pacific.

Between the sea and the intermediate slopes of the Andes Peru is an utter desert, save in the narrowest irrigated valleys where mountain torrents rush down from peaks which frequently exceed 20,000 feet in elevation. These streams usually are about 30 miles apart, but in one sector are separated by as much as 100 miles.

While the desert area in general is a broad bench, in some places the relief is great, the valleys deeply incised, and the terrain rugged in the extreme. Because of this difficult topography and wide spacing of the narrow productive valleys, there is no north - south railway, and only one highway serving the length of the country. Motor roads and a few short railroads run inland from the principal seaport towns up the valleys toward the Andes. Save in the Callao-Lima link they tap no poulation areas of consequence.

• Climatologically, Peru is a paradox. Although situated almost on the Equator, temperatures are mild. The mean temperature is about 70°, ranging from 55 to 90° on the coast. In the northerly portion of the country temperatures rise to higher levels.

Extraordinary oceanographic conditions are responsible alike for the mild climate and the virtually complete lack of rainfall which prevails along the entire coastline of Peru, and extends into Chile for some hundreds of miles. It is literally true that no measurable rain may fall for periods of years on some portions of the Peruvian coast. In the north, on the other hand, there is immediate change as Peru is left, and coastal Ecuador has the heavy precipitation generally associated with equatorial climate.

About one-third of Peru's 9,000,000 population live in the narrow coastal belt, and 1,000,000 of them in centrally-located metropolitan Lima alone. The balance are widely scattered in small towns and cities along 1,400 miles of coastal desert with its occasional irrigated valleys. Arequipa, second city in Peru, has a population of approximately 200,000.

The Peruvian coast is a compact one, without major indentation and with very few protected bays, most

PERUVIAN FISH EXPORT BY PRODUCT TYPES

(Quantities in metric tons, equivalent to 2,200 pounds.)

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Salted fish	1,773	4,085	7,040	232	..	..	..	..	..		..	..	..
Dried fish	39	51	23	45	8	7	..	..	..		..	..	134
Fish livers	738	695	554	476	78	8	1	..	..		..	..	..
Canned fish	915	1,754	2,653	4,618	4,872	6,199	8,721	8,995	12,665	10,708	14,720	16,709	18,501
Frozen fish	..	..	..	..	712	2,611	9,106	8,364	8,171	6,317	11,772	11,840	12,885
Fish meal	..	..	..	474	675	2,708	3,742	6,051	9,096	10,609	14,040	18,768	27,792
Fish oil	..	..	66	62	43	7	..	120	..	143	..	92	1,721
Shell fish	..	..	..	..	2	8	..	..	..	..	295	..	..
Other	182	2	224	323	50	..	..	4	..	3,754	5,667	5,252	5,417
Total	**3,647**	**6,587**	**10,560**	**6,230**	**6,440**	**11,549**	**21,570**	**23,534**	**23,932**	**31,531**	**46,500**	**52,711**	**66,450**

(Value in thousands of Soles, each equivalent to U. S. $0.0528)

Salted fish	619	1,317	4,001	242	..	..	..	..	..	..	..	..	..
Dried fish	18	35	12	35	10	10	..	..	..	..	6	93	232
Fish livers	237	218	268	980	79	39	5	..	..	..	..	..	..
Canned fish	2,623	4,988	8,082	14,915	17,106	43,050	58,501	65,878	84,334	84,164	154,927	149,819	176,572
Frozen fish	..	..	..	..	898	6,957	22,762	18,190	23,452	19,230	42,080	38,180	35,618
Fish meal	..	..	..	210	271	2,206	4,250	7,082	12,572	16,184	22,571	37,910	67,211
Fish oil	..	..	104	116	29	17	..	235	..	333	515	185	4,357
Shell fish	..	2	..	..	2	20	1	..	..	..	..	..	..
Other	59	2	107	164	22	3	9	2	..	7,429	14,829	14,693	15,471
Total	**3,556**	**6,562**	**12,574**	**16,662**	**18,417**	**52,302**	**85,528**	**91,387**	**120,358**	**127,340**	**234,928**	**240,880**	**299,461**

of them in the general vicinity of Chimbote, which itself has perhaps the best harbor on the coast.

This lack of shelter on a coast where there is normally a stiff prevailing southerly wind, and often considerable surge, imposes a severe handicap on fishing and packing operations. In comparatively few places has it proven economically feasible to provide piers sufficient for delivery of fishing vessels can be maintained, ocean vessels cannot lie at them, and virtually all shipments are handled by means of lighterage. At some of the principal fishery ports, such as Mancora, it is actually necessary to handle everything through the surf by means of skiffs.

• As the Andes are the prime physical feature of the geography of Peru, so the Peruvian, or Humboldt, current dominates the hydrography of its sea and creates the anomaly of the coastal desert.

Existence of the northward-flowing current sweeping the west coast of South America from southern Chile to the northern extremity of Peru was recognized by the earliest explorers, and all who since have sailed these seas in their tracks. The current is manifest in its temperature as well as in its movement, for it is markedly colder than the larger seas through which it flows.

For generations the current was considered as a river in the sea, flowing from Antarctic sources. This concept, which derived alike from the coldness of the current and the direction of its flow, has been superceded in recent years in the thinking of oceanographers. The present theory ascribes the current movement directly to the influence of the Southeast Trade Winds and its coldness primarily to the upwelling of deep, nutrient-rich waters to take the place of the surface waters moving north and finally offshore from Punta Parinas and Paita under the thrust of the unceasing Trades.

Thus the Peruvian Current is described today as a northward movement of surface waters under wind influence, with coastal upwelling of cold, richly nutrient waters rising from ocean depths to replace the surface waters removed by the current, As its northerly direction, influenced by the configuration of the coast, carries the Peruvian Current out from the continental coast it becomes the South Equatorial Current.

Analogy exists in the North American tropics, where the California Current flows south until it swings offshore and becomes the westward-flowing North Equatorial Current.

• The rich, cold waters of the Peruvian Current are wondrously productive in all links of the marine food chain: phyto-plankton, zoo-plankton, larval forms, small fish, large fish, birds, mammals and Man.

Mariners and naturalists for generations have marvelled at the white islands of the Peruvian coast, piled to astonishing depths with guano, the accumulated dropping of enormous numbers of sea birds. That such flocks could be supported was plain evidence of an abundance of fish perhaps unmatched in all the world. That such quantities of their droppings could accumulate on coastal islands can be credited only to the fact that these are rainless shores, where the droppings dry to become guano, unleached and uneroded by rain.

For all of this the Peruvian Current is responsible, for the life that makes the very sea alive; for the drouth which makes the tropical shore a desert.

• Climate of Peru is shaped by the strange, cold current off its coast.

The discoverers may have known of the Peruvian weather phenomenon before they experienced it, for there is an ancient story that the first navigators, asking their informers how they would know when they had reached Peru, were told: "When there are no trees upon the shore you are in Peru."

Reason for this condition perplexed mariners and naturalists for generations, until Alexander von Humboldt evolved a wholly satisfactory theory in explanation. Briefly, and in lay language, it is this:

A Cruel Coast and the bleached bones of the once proud schooner **William Taylor,** which was originally refrigerated for halibut freezing at Alitak, Kodiak Island, Alaska, and later went to Peru to meet only loss, defeat and destruction. She lies today in a grim cove between Coishco and Chimbote, with a ghostly guano island offshore.

The winds which create the current are chilled by the cold waters which become a part of it as they well up from the depths. Winds blowing over the sea pick-up moisture to the extent of their capacity to retain it—a capacity which is relatively limited because of the coldness of the atmospheric temperatures.

Reaching the coast, where the land is much warmer than the water of the sea, the winds are warmed, their ability to *retain* moisture is increased, and thus no rain falls even though the winds are elevated by the coast and the tremendous range of mountains a short distance inland. Rain falls eventually, but only in the mountains, and most of it in the Amazon.

Humboldt's interpretation of the phenomena of the current of Peru led to it being called the Humboldt Current for many years, and so it remains in popular nomenclature, although the geographers and oceanographers, scorning the personalities of the pioneers they follow, prefer the geographic term Peruvian Current.

The coast of Peru is one of the driest places on earth; certainly one of the driest coasts. Rain may not fall for years at a time, three, five, seven years.

• El Nino is an aberration of ocean conditions off the coast of Peru which profoundly affects current, climate, weather, rainfall, fisheries, bird life, guano production and in short all the environmental and economic aspects of the sea and coastal region of Peru.

Why is the condition called El Nino? Because its onset is usually first detected at about the time of Christmas, and thus it is associated with the advent of El Nino, The Child.

What is it?

Dr. Robert Cushman Murphy, Lamont Curator Emeritus of Birds, American Museum of Natural History, an authority on the biology and ecology of the guano birds of Peru, speaks of El Nino as a period when:

"A profound displacement of the atmospheric pressure field and a resultant shift in the distribution of southern-hemisphere winds causes a southward transgression of surface water, cessation of upwelling, rising surface temperatures, disastrous rainfall, and the devastation of life in the sea, including microorganisms, fish, and birds".

Specifically, under certain oceanic wind conditions during the late summer in the Southern Hemisphere, a portion of the east-flowing Equatorial Counter Current tends to flow south along the coast of Peru, either forcing the northward-flowing Peruvian Current offshore or over-riding it with a warmer, lighter, less fertile layer of water from the equatorial belt. At present students of the phenomenon are inclined to favor the over-flowing rather than the displacement concept, as the tongue of warm water associated with El Nino appears to be relatively shallow.

This intrusion of warm sea water may extend down the coast of Peru as far as Pisco, although usually it is

Peruvian anchovy seiners watch as the fish pump at Casma discharges their boat. Few of these seiners have pumps sufficient to flood their holds, so the fish pump must perform this function through the second hose shown.

Coishco From Above —Cannery building fills the right foreground, with the reduction plant at the right rear. Cold storage is at the left, with canned goods warehouse adjoining it in center.

not noted much below Callao. Its effect, however, in manifest in some degree along the entire coast.

• Occurrence of El Nino is irregular. The record of earlier years is incomplete, but the literature makes specific reference to El Nino years in 1925, 1939, 1941, 1952, 1953, 1957.

The current year 1957 departed from the observed pattern of previous occurrences, although it must be accepted that only since the rise of an active industrial fishery has there been sufficiently close and comprehensive observation disclose details of the phenomenon. The El Nino of 1957 appeared to have two phases. The first intrusion of warm water seemed to withdraw quite early and normal conditions were rapidly being restored when a new thrust of warm water from the north reversed the recovery.

In 1952 there was a very definite and damaging El Nino, which was followed by a recurrence the following summer. (Seasonal references here are to those prevailing in the Southern Hemisphere.)

So far as the record shows, this was the only known instance of consecutive El Ninos. The Peruvian fishing industry watches 1958 with keen concern, lest it disclose a hitherto undetected consecutive-year cycle.

Effect of El Nino upon the fisheries of Peru includes:

1. *Bonito*—Occurrence and availability greatly disturbed. Range in abundance does not extend as far north as normal. Fish tend to become soft early. Cost of fishing is increased; tonnage taken is reduced; overall quality level is lowered.

2. *Tuna* — Range runs further south than usual, but occurrences are sporadic and fishing uncertain. Percentage of Skipjack rises with reference to Yellowfish in the total catch.

3. *Anchovy* — Natural mortality appears to be greatly increased, with immense quantities of fish dead on the beaches. Fishing is poor, although there is some evidence that this is a matter of availability and that the schools may be seeking cooler water at depth. The guano birds particularly from the scarcity of anchovies on the surface, and in 1957 heavy migrations of the birds southward were noted.

• "Braveza" is the Peruvian term for a second, but much less profound and important, phenomenon of ocean conditions along that coast, which has no storms of violence.

Braveza is a broad term for heavy surf, which may be accompanied by some wind of force, but usually is not.

Presumably produced by the residual wave effect of a violent storm or typhoon far off-shore, the Braveza can be seriously destructive to the fishing fleets and facilities on the roadsteads and exposed anchorages and shallow bays of the Peruvian coast.

The condition usually develops two or three times a year, lasting three or four days. The heavy surf is not accompanied by high water as a rule.

• *Bonito* beyond question is the foremost economic species among Peruvian fishes. The name derives from the Spanish and may be translated The Pretty One. Scientific name is *Sarda chilensis,* and the fish is generally considered a separate species from that taken in California, where the name *Sarda lineolata* is used. That the two species are identical and should be taken together under the name *Sarda chilensis* is contended by some scientists. The bonito taken off Peru

Sanitation is Served at Ilo with Episa and Morrison-Knudsen-Utah contractors cooperating to provide this fogging of the entire Ilo community regularly with malathion insecticide. Here the Episa plant is wholly hidden by the fog.

normally range from 6 to 8 pounds in weight. They are caught by means of seines and gillnets, usually on day trips, and often within sight of land.

Commercial fishery for the bonito extended from northern Chile along the coast of Peru to an indefinite point between Chimbote and Paita, where the occurrence of the species thins out.

• *Anchovy* population of the ocean off Peru consists of a single species, *Engraulis ringens,* a very small variety, but a true anchovy.

Although this fish is called "anchoveta" by the Peruvians, it is entirely distinct from the anchoveta of Mexico and Central America, *Cetengraulis mysticetus,* largely used as a tuna bait fish by the California clippers, and not a true anchovy, although a closely related form.

Anchovy are taken in Peruvian waters throughout the year, although availability declines during the winter months. At that time fishermen believe the anchovies swim at greater depth, below the reach of most of their gear.

Economic range of the anchovy along the coast of Peru extends from Ilo on the south north to the vicinity of Paita, although there is no reduction plant working primarily on this species north of Choisco, just above Chimbote.

Adequate means of measuring the abundance of the anchovies is perhaps the most demanding scientific need of Peruvian marine biology today. Thus far only informed guesses can be hazarded. Dr. Erwin Schweigger, oceanographer of the Guano Administration, has suggested that when anchovy abundance is at high level the population would be on the order of 20 million metric tons. There are approximately 50,000 of the little 20-gram fish in a ton, so the number of fish in 20 million tons would be represented by 10 raised to the twelfth power.

• *Tuna* range regularly in Peru in the northerly sector of the coast, above Sechura, with the principal landings at Paita, Mancora and Zorritos.

These are slightly warmer waters, where the Peruvian Current trends offshore, and where the Equatorial Counter Current impinges upon the coast.

Principal species in the Peruvian tuna catch is Skipjack, *Katsuwonus pelamis,* which accounts for from 60 to 75%, with Yellowfin, *Neothunnus macropterus,* making up the rest. In El Nino years, as in 1957, the percentage of Skipjack rises at the expense of Yellowfin.

Three Figures at Ilo—Cameron Draney, left, is manager of Empresa Pesquera Ilo S.A., with Cecil Howden, superintendent, in the center. Right, is Capt. Jack Borcich, master of the tuna seiner **Sun Star.**

All tuna are frozen and later shipped to the American market. The season runs throughout the year, with the best fishing during the late summer months.

• *Swordfish* traditionally are identified with the northerly knob on the coast of Peru, that ultimate westerly extremity of South America where the Peruvian Current takes its leave of the coast. Prime port for this fishery is Mancora, although swords also are handled as far south as Paita and, rarely, at other ports.

Sailfish and marlin are primarily the sportsman's quarry, for they are low in edibility and almost without market. Swordfish, *Xiphias gladius,* is another matter—and the swordfish of Peru command a price premium over those from any other part of the world.

Swordfish are taken commercially almost entirely with harpoons thrust from small, nimble power vessels; and in Peruvian waters wholly in the course of day trips, as the swordfish boats are not equipped to remain at sea more than a day at a time. In this fact may lie the reason for the premium enjoyed by these Peruvians swords. Few come to the freezers more than five hours dead. The size is exceptionally uniform—about 160 pounds — and just what the market most esteems.

• *Fresh fish* most esteemed in Peru is the corvina, *Sciaena gilberti,* a white-fleshed fish used in many forms, and perhaps most commonly in "cevich", a traditional dish in which cubes of the raw fish are marinated in lime juice with shredded onion and hot orange-colored peppers, "aji".

Linguado, a large flatfish about the size of a chicken halibut, is also highly regarded in the Peruvian cuisine.

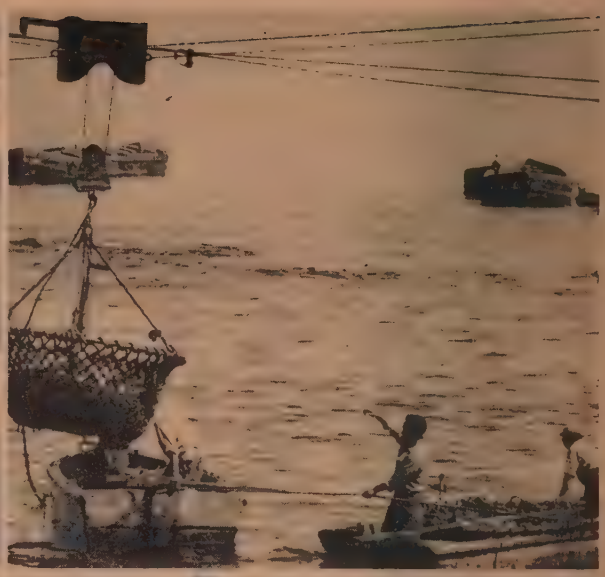
• *Giant Squid,* which frequently attain an overall length on the order of seven to eight feet, are swimming nightmares of the Peruvian seas. Among the largest of the molluscs, these voracious creatures have largely defeated efforts at longline fishing because when they are present the squid strip the bait from the hooks as fast as the lines are set.

While the average weight of the giant squid is in the neighborhood of 50 pounds, speciments to several hundreds of pounds in weight have been taken. Efforts to utilize them economically have not as yet been succesful, although it does appear that there may be possibilities of selling giant squid frozen for use as bait in some North American fisheries.

• *Sperm whales* traditionally are thought to feed upon giant squid as their favorite food, a belief which apparently has grown as result of finding large quantities of the beaks of these squid in the stomachs of this species of toothed whale.

The coast of Peru from Pisco to Paita is regarded as one of the world's notables areas of concentration for sperm whales, and many observers attribute this fact in particular to the abundance of the giant squad found in this same region.

• *Machete* are among the minor fish used for canning, and to a larger extent perhaps for reduction. This species, *Ethemidium chilcae,* is called a "herring" in the Peruvian vernacular, although it bears but scant resemblance to a clupeoid. This fish is



Discharging Bonito on the rocky shore at Ilo. **Upper left**—Bonito are discharged from the carrier "Cavalieri" into a rope basket in a skiff alongside, while a loaded skiff pulls away. **Upper right**—Skyline lifts a basket of bonito from one skiff, while another prepares for spotting underneath the hoisting tackle. **Lower left**—Basket of bonito ride the skyline over the surf and rocky shore at Ilo. **Lower right**—Bottom of the basket opens, discharging the fish into a hopper from which it will slide into trucks for transport to the cannery.

occasionally used for canning in sauce for the domestic trade, although the quantity so packed is small.

Hake, Merluccius species, are present in some abundance, particularly in southern Peru, and with Machete bear some promise as material for the reduction industry.

• *Shrimp* are just beginning to enter Peru's industrial fishing as a factor of importance, and that only in the extreme north and west sector, abutting upon the Gulf of Guayaquil.

The shrimping grounds presently available to the Peruvians are small and unless they can be expanded the prospective production is limited so far as Peru is concerned.

The shrimp taken are very large and of extremely fine quality. They range in color from white into the pale pink types, but appear all to be the same species with color variations.

• Fishing areas of Peru, considered geographically and as to the species utilized, count up to four, or perhaps one should sub-divide the northern sector and count five.

In some instances the areas overlap, with fishermen from more than one center working the same sea. In others they are widely separate, with little fishing in between; not so much because there are no fish as because there are no harbors, or plants to which to deliver, and because the forces of wind and current react to render fishery development of the sector difficult and uneconomic.

Northerly area perhaps should be divided into two on the basis of a difference in fish handled. The area which abuts upon the Ecuadorean boundary in the Gulf of Guayaquil centers at Mancora and receives *shrimp, swordfish* and *tuna* as its primary products. Operations are entirely concerned with freezing, there being no canneries or reduction plants.

Second segment of the northerly of Peru's fishing areas centers at Paita, with some overlapping of the Mancora sector on the north, and extending southward down the coast to include Sechura. Deliveries are primarily *tuna,* with some *swordfish, trawl fish* for the fresh market, *sperm whales* and some *anchovies.* Plants include a cannery, freezing plants and reduction for anchovies and whales.

North Central area finds its focal point at Chimbote, largest fishery center in Peru, and includes a number of other ports for perhaps 100 miles along the coast to the south, where there is a good deal of overlap with the Central area bearing on Callao. Industrial fishing of the North Central area depends almost wholly on *bonito* and *anchovy*, with numerous canneries for the first and reduction plants for manufacturing meal and oil from the latter. *Machete* is used to a minor degree for canning and reduction.

Central sector of the Peruvian fisheries has headquarters at Callao. To the north it extends into common ground with Chimbote, and on the south includes Pisco, about 200 miles away. While most of the supplies for this area are landed directly at Callao, some are received by truck over the Pan-American Highway from ports to the north and south. Callao and its tributary area handle *bonito* and *anchovy* as principal species, using them respectively for canning and reduction; and also has the largest Peruvian business in fresh fish, due to its proximity to Lima, with the only metropolitan population in the country.

Southern district finds its focus at Ilo, which itself is the southern-most port on the entire coast of Peru, roughly 100 miles above the border with Chile. Only other port of any significance within this area is Mollendo. Ilo, with two canneries, two reduction plants and a freezer, handles *bonito* and *anchovy* as its principal landings, with Yellowfin *tuna* delivered in volume which varies widely and unpredictably from year to year.

• Seasonal activity in Peru's fishing and packing begins to rise as August advances and continues to increase until about November, when it levels-off and holds at a high level of productivity and quality through February. Then a gradual decline sets-in, continuing until operations reach a level of relative inactivity by May.

This seasonal activity curve applies to the principal fisheries, bonito, anchovy, tuna, although the latter two apparently are available to suitable gear throughout the year.

Bonito operations are governed in large degree by the fact that the fish are not prime for canning during the winter months in the Southern Hemisphere.

• *Abundance* and *Potential* of Peru's principal species simply cannot be measured or estimated with any degree of confidence in the present extent of human knowledge.

Loaded Seiner comes up to the dock at Chimbote, Peru's largest fish port, with a deep water harbor and ocean steamer service.

Competent, qualified observers, ranging all the way from fishermen to scientists, and with years of experience on which to base their opinions, have no hesitancy in declaring that both abundance and potential are *very great;* but just *how* great cannot soundly be said without a great deal more information than even the best-informed now have at their disposal.

On the basis of distribution alone there is much to be learned. How far the bonito and tuna and anchovies extend to sea has not yet been accurately determined. Tuna clippers sometimes make bait 60 miles to sea from schools of anchovies, but most of today's commercial catches are made within easy sight of land, often barely beyond the surf.

Nor has there been comprehensive exploration in depth, with gear of size and type which may find fish, notably anchovy, at seasons when the species is not seen on the surface.

Biologically much must be known before the potential of the resources—and anchovy must be accepted as distinct from bonito, and tuna from both—can be approximated.

Biology must learn how to determine the relative abundance of the bonito and anchovy and tuna populations from year to year in order to determine the reaction of these species to fishery—and this includes of course the fantastic predation of the enormous flocks of birds as well as the relatively limited catch by man—before it can know even a little of the potential of the resource, which actually is a measure of how well abundance can be sustained under exploitation.

The resilience of a population under use must be measured before knowledge of the long-range abundance of that population—its "potential"— can be assessed.

• Growth of the Peruvian industrial fisheries today appears to be limited only by two factors:

1. For bonito and tuna, Markets—the ability to sell canned bonito and frozen tuna profitably in the United States, the United Kingdom and Europe.

2. For anchovies, Scientific Research — because the Peruvian government has placed a ceiling on further expansion of anchovy reduction until biological investigation of the population dynamics can determine the effect of further fishing upon the resource, and upon the government guano monopoly which indirectly depends upon the anchovy.

Attack upon these two problems is being mounted in Peru.

The industry in 1957 studies product promotion and advertising in promising markets with a view to expanding and improving the export markets for Peruvian canned bonito, primarily in the United States, already the largest consumer of the product.

Similarly, the Peruvian Hydro-Biological Council is expected to undertake as its primary scientific study a means of assessing the anchovy resource, testing its health, and measuring its reaction to Man's fishing as well as predation by birds.

Fish Producers of Peru

(Product Code: C, Canned Fish; F, Fish Freezing; R, Fish Reduction; W, Whale Reduction)

Products	Producer	Location	Address	Manager
C	Conservas Peruanas S.A.	Callao	Calle Loreto 874, Callao	Juan Idesis
C-R	Cia. Pesquera LaPeruana S.A.	Callao	Carabaya 831 Of. 407, Lima	Pedro Martinez
C-R	Empresa Pesquera San Jose S.A.	Callao	Calle Constitucion 609, Callao	Jose Mandriotti
C-R	Empresa Pesquera Chalaca S.A.	Callao	Av. Tacna 592, Of. 24, Lima	Manuel Elguera
C-R	Fac. de Conservas Marfe S.A.	Callao	Apurimac 162, Callao	Jorge Malatesta
C	Industrial Conservera S. en C.	Callao	Av. Pacifico 879, Callao	Pascual Saco Salcedo
C-R	Industrias Marinas Alimenticias S.A.	Callao	Calle Primera 249, Callao	Hugo Carillo
C-R	Panamerican Fish Packing S.A.	Callao	Calle Ancash 870, Callao	Marcos Ghio G.
C	Pesquera Virgilio	Callao	Contralmarante Mora 300, Callao	Carlos Virgilio
C	Sindicato Pesquero del Peru S.A.	Callao	Contralmirante Mora 250, Callao	Santiago Schiaffino
R	Fabrica de Conservas America S.R.Ltda	Callao	Ramon Espinoza 190, Rimac	Isaac Maimon
R	Factoria Harina de Pescado	Callao	Plateros de San Agustin 187, Lima	Pedro Bidegaray
R	Industria Conservera Alimenticia S.A.	Callao	Jr. Ayacucho 631, Callao	A. Goytizelo
R	Cia. Italo Peruana de Pesca	Callao	Edif. Oztolaza 4° Piso, Lima	Mario Vela
C	Cia. Pesquera La Florida S.A.	Chimbote	Edif. International Of. 87, Lima	Luis Banchero
C-R	Conservas Miramar S.A.	Chimbote	Av. Tacna 592, Of. 24, Lima	Manuel Elguera
C	Envasadora Chimbote S.A.	Chimbote	La Mar 357, Callao	Luis Vascones C.
C	Envasadora Sta. Rosa S.A.	Chimbote	Av. Tacna 592, Of. 24, Lima	Julio Reyes
C-R	Alfonso Figuerola Arara e Hijos S.A.	Chimbote	Chimbote	Alfonso Figuerola
C	Cia Pesquera Bebsa S.A.	Chimbote	Chimbote	Honorio Farro
C	Felipe Ganoza S.A.	Chimbote	Chimbote	Felipe Ganoza
C-R-F	Cia. Pesquera Bebsa S.A.	Chimbote	Edif. Del Castillo 611, Lima	Manuel Almenara
R	Bibaco S.A.	Chimbote	Jr. Union 284, Lima	Ricardo Molinari
R	Inca Fishing Co.	Chimbote	Av. Iquique 1397, Lima	Enrique de Solar
R	Conservas Harinas Peruanas S.A.	Chimbote	Prol. Ayda. Argentina 346, Callao	Carlos Olivares
R	Cerro Azul S.A.	Chimbote	G. Naranjo 172, Lima	Demetrio Castagnon
R	Empresa Pesquera Chimu S.A.	Chimbote	Edif. Tacna 592, Of. 24, Lima	Manuel Elguera
R	Andes Fishing Co. S.A.	Chimbote	Antonio Maroquesada 301, Of. 611	Dalla Porte
R	Pesquera Humboldt S.A.	Chimbote	Carabaya 831, Of. 406, Lima	Luis Banchero
F	Star Kist Peruana S.A.	Chimbote	Edif. Rimac 2, Pas. Acuna 127, Lima	George Gligo
C	Battilana Hnos.	Lima	Av. Iquitos 1054, Lima	Adolfo Battilana
C	Cia. de Conservas de Pescado S.A.	Lima	Av. Colonial 459, Lima	Jose Giugliano
C	Env. Nacional de Prod. Alimenticios S.A.	Lima	Prol. Mariateguia 105, Barranco	Eduardo Segersbol
C	Envasadora Rimac S.A.	Lima	Av. El Trabajo 265, Lima	Ricardo Salerno
C	Fca. de Conservas Alimenticias S.A.	Lima	Alameda de los Bobos 212, Lima	Santiago Casaretto
C	Fab. de Conservas America S.R.Ltda.	Lima	Ramon Espinoza 190, Lima	Isaac Maimon
C	Battilana Atilio Carquin	Huacho	Prolongaciou Grau s/n apart. 147, Huacho	Mario Battilana
C	Conservera Garquin S.A.	Huacho	Salaverry 148, Casilla 147, Huacho	Guido Giardi
C-R	Conservas y Salazones S.A.	Huacho	Calle San Jose 312 altos, Lima	Carlos Otero Lora
C	Soc. Industrial Conservera Alimenticia	Huacho	Jr. Arequipa 677, Lima	Jose Gutierrez
R	Aminco Mar S.A.	Huacho	Jr. Puno 239, Lima	A. Magnificio
C	Cia. de Pesca San Pedro S.A.	Ilo	Calle La Merced 308, Apdo 279, Arequipa	Jorge Bedoya Forga
C-R-F	Empresa Pesquera Ilo S.A.	Ilo	Av. Tacna 592, Of. 24, Lima	Manuel Elguera
C-R-W	Cia. Maritima Pesquera S.A.	Chancay	Azangaro 235, Lima	Eberhard Mayser
R	Cia. Maritima Pesquera S.A.	Casma	Azangaro 235, Lima	W. Wegener
C	Industria Conservera Alimenticia S.A.	Chancay	Jr. Ayacucho 631, Callao	Armando Goytizola
R	Cia. Explotadora Productos del Mar	Casma	Edif. Tacna 592, Lima	Jorge Ganoza
F	Cia. de Negocios de Ultramar S.A.	Mancora	Carabaya 831, Of. 406, Lima	F. D. Wyatt
F	Cia. Pesquera Mancora S.A.	Mancora	Edif. Ostolaza 5° Piso, Lima	Rafael Grana
F	Interamerican de Nav. y Negocios S.A.	Mancora	Av. Paz. Soldan 131, Calloa	Cesar Vallarino
F	Mercante Peruana S.A.	Mancora	Jr. Ica 121, Edif. Select 405	Eleodora Galarezo
C	Sociedad Pesquera Cantabria S.A.	Huarmey	Pza. San Martin 181, Lima	Epifanio Aofra
R	Cia. Industrial Pesquera Huarmey	Huarmey	Edif. Italia, 306, Lima	J. Arguelles
R	Industrial Pesquera de Rosario S.A.	Huarmey	Azengaro 430, Lima, Of. 301	H. Lavalle
W	Cia. Ballenera del Norte	Paita		Jas. S. Russell
C-F	Frigerificos Paita S.A.	Paita	Edif. Atlas 10° Piso, Lima	John Day
R	Pesquera Paracas S.A.	Paracas	Edif. Italia, Lampa 921, Lima	Mario Jacobs P.
F	Marinos Refrigerados S.A.	Caleta Cruz	Casillo 143, Tumbes	Chas. H. Kollmeyer
R-F	Frigerificos Paita, S.A.	Red Rock	Edif. Atlas, 10° Piso, Lima	John Day
W	Consorcio Ballenera	Pisco		
C	Cia. Pesquera de Coishco S.A.	Coishco	Edif. Rimac 2, Pas Acuna 127, Lima	Manuel Almenara
C-R	Corp. Financ. y Commercial Amial Peruana S.A.	Samanco	Calle Correo 169, Lima	S. Kroupnitzky
C-R	Empresa Pesquera Peru S.A.	Supe	Carabaya 831, Of. 313, Lima	Carl Hedreen
C-R	Empresa Pesquera Mollendo S.A.	Mollendo	Av. Nicolas de Pierola 611, Lima	Claudio Fernandez Concha
C-R	Empresa Pesquera Naple S.A.	Pucusana	Av. Nicolas de Pierola 611, Lima	Juan Jose Suelves

Women Work with men on the nylon nets at Chancai, Peru, á gravel beach at the base of a guano hill serving as a net rack. Right rear, a typical small anchovy seiner.

Chapter V.

Free Enterprise and Sound Economy

• Freedom of individual initiative and enterprise inevitably must command attention of the stranger who seeks to understand modern Peru, and particularly its fishing industry — for fishing utilizes a natural resource, and in man's philosophy fish are the property of *all* until some *one* catches them.

In most countries this has given rise to regulation of the activities of those who seek to profit by translating the common fishery resource into food and economic growth for all, and profit for himself.

Not so in Peru, where fishery operations are perhaps as free and unrestricted as those of any country in the world. There are no legal seasons, only nominal rules with respect to gear, closed areas limited to bays and the waters near guano islands, and no quota on units of gear or intensity of operation. Port captains and the national Fish and Wildlife Service may, however, attempt control in local or emergency situations.

There is one exception, one large and very important exception, to the statement that development is free and unrestricted. This is the decree which at the instance of the Guano Administration for the present limits reduction plants to those authorized by the end of 1956 and activated by the end of 1957.

The Guano Administration, properly the Compania Administradora del Guano, is the agency of the Peruvian government which controls the guano resource, sells the product to Peruvian farmers at a price which is in effect a subsidy, and opposes the development of Peruvians as fishermen competitors with the predatory birds for a share of the anchovy resource.

With the national salt monopoly, the Guano Administrator is the rule-proving exception to Peru's governmental abstention from commercial competition with private enterprise.

• Peru's doctrine of free enterprise in all things, and fishing among them, is all the more interesting when one re-

Coishco "Brass"—Dr. Manuel Almenara, left, president of Cia. Pesquera de Coishco S.A., and Paul Gligo, general manager of operations.

Bonito Boats Discharging at the fish pier at Chimbote. The fish are sold at auction and trucked to the buyers' plants. All landings are made the day of catching, and the fish are often delivered bright with the irridescence which won the species the name of Bonito—"pretty."

flects that under the Inca regime Peru had what was perhaps the most communistic system of government the world has ever known.

All property was owned by the government, and the Inca, the Sun-God, *was* the government, the state, to a degree that Louis XIV never dreamed. All that a man produced went into the common store, to be doled out again "according to his need", along with orders as to every detail of every hour and act.

• Under Spain, and since, individual and private enterprise have been virtually free of control and hinderance; and this has been particularly true in fisheries.

The industry which has grown from virtually nothing in 1945 to stature of note in the fisheries of the world has done so on the basis of individual enterprise and investment—primarily Peruvian, with important collaboration of experience and finance from the United States. But this was all private enterprise, private money, private courage; and its result has been private profit, and private loss on occasion.

In Peru there are no fishing seasons, no regulations, no restrictions on type of gear or method of its use. Not that there never will be, but in a decade of developing an immense resource men have been concerned more with soundness from the standpoint of business rather than of biology. The kind of leadership manifest in the Peruvian industry gives good assurance that the conservation concept will be applied before correction becomes mandatory and depletion develops.

The fisheries of Peru give ample evidence, despite the salt and guano exceptions, of Peruvian devotion in policy and philosophy to the ideal of private enterprise. This devotion has its corollary in utter rejection by the Peruvian people of Communism, despite the political gains of APRA, permitted by the present Prado regime to emerge from underground and resume its status as a political party. Here is a vocal minority whose strength appears to lie primarily in the complaisance of the vast popular majority rather than in any strength inherent in its own philosophy or the numbers of its communicants.

• If Peru's governmental policies broadly affecting the fisheries are few, those which do exist are built deeply into the national thinking common to all parties. There are three basic tenets of political doctrine with respect to fisheries. Indeed, realistic businessmen including those engaged in industrial fishing, generally will accept these principles as essential to sound growth.

They are:

1. The thesis that a coastal state has a special interest, approaching sovereignty, in the fishery resources of the contiguous sea to any width which may be necessary to protect that special interest of its nationals.

2. Domestic needs must be satisfied before any export of fish is allowed; and the demands of the fresh fish market must be satisfied before fish may be canned.

3. Agriculture has a paramount position in Peru. The guano resource must be protected; and any fishery conservation study must recognize the validity of this position.

Hydro-Biological Council

• Scientific studies of the marine resources of Peru entered a new phase in 1957 under the National Hydro-Biologic Council, an official agency which plans, coordinates and directs all Peruvian research with relation to the sea, its coast, the fish, bird and shellfish life of the ocean and littoral.

The Council is composed of representatives of the Peruvian Navy, the fishing industry, the guano corporation, and the national fish and game department. Its chairman is Admiral Guillermo Tirado, superintendent of the Naval Academy and former naval chief of staff. Treasurer is Manuel Elguera, representing the fishing industry, of whose Sociedad Nacional de Pesqueria he is president.

• Hitherto research in the broad field now administered by this council was confined almost wholly to the hydrographic and oceanographic investigations of the Navy and the biological, ecological and oceanographic studies supported by the guano corporation.

These studies now become a part of the responsibility of the Hydro-Biologic Council.

The broader research program is

Desert Storehouse—Hundreds of tons of fish meal stored in the open on the desert just behind the plant at Coishco. Structure at the lower right provides shore quarters for fishermen, while those in the left background are quarters for plant employes.

being developed by the council carefully and in consultation with interested agencies elsewhere, notably the Inter-American Tropical Tuna Commission and the Scripps Institution of Oceanography. It is anticipated that the studies of the Hydro-Biologic Council will complement those of the Tuna Commission in particular, and certainly they will be designed to the highest scientific standards.

• Funds for the researches of the Hydro-Biologic Council are derived from the fees paid by foreign tuna vessels — which to all practical purposes means the United States tuna clippers — under terms of the decree of the Peruvian government "for the purpose of protecting and conserving the use of the living resources of the sea that are essential to the national life, so that they may be exploited in such a manner as not to impair the country's economy or its production of food." The decree applies to "the jurisdictional waters of Peru" the activities of foreign fishing vessels "which wish to engage in fishery activities in water under national jurisdiction".

All funds derived from the annual registration certificates, costing $200 per vessel, and the 100-day permits costing $12 per net registered ton of the vessel, are used for the scientific researches of the Hydro-Biologic Council. Thus the fees paid by American vessels to Peru are plowed back into scientific studies productive of information benefitting the fishing vessels support the research.

• Thus it is that Peru mounts a scientific program for the research study of its marine resources in the early phases of their exploitation, while the condition is still sound, while the essential statistics can be gathered from the beginnings of industrial development, and while science can study a healthy patient and devise means of measuring populations and detecting changes in their abundance before depletion becomes a problem.

In short, the objective of this research is sustained yield for a rich resource rather than its rehabilitation after damage.

Economic Aid Program

• United States participation in development of Peru's fishery resources under the economic assistance programs began in the Fiedler Survey of 1941; and after World War II was extended in the Jarvis technological studies of 1949-1950.

Cosmopolitan aspect of the Peruvian fisheries finds S. Shibata, Conulsa's Japanese net boss at Mancora hanging Peruvian web to rope manufactured in the Philippines and floated with Spongex plastic corks made in the United States.

In recent years United States federal participation in Peruvian fisheries has been concerned essentially with efforts to develop trout populations in Andean lakes and streams as a protein food supplement for the protein-lacking subsistence diet of the people.

Rainbow trout of United States origin, originally introduced indirectly through Chile, proved particularly adapted to lakes of the Andes such as Titicaca and other large bodies of water, where the fish grew rapidly and sometimes attain prodigious size.

Propagative of these trout from Peruvian stocks, distribution to unstocked lakes, education of the mountain population in improved methods of fishing, and their encouragement in the use of trout as a source of animal protein, is a task of the U.S. Operations Mission of the Department of State, and its being conducted in Peru under direction of Robert O. Smith, formerly of the U.S. Fish and Wildlife Service.

There is a tendency for the Andean people to use the trout as a cash crop rather than as a source of protein food for themselves, selling their catches where transportation is available to markets in such cities as Lima and Arequipa.

The Fisheries Technological Laboratory of the Peruvian Ministry of Agriculture and Fisheries at Callao has conducted some experiments in canning the large Andean trout — which may reach a weight of 60 pounds. Commercial fishery operators also have given some attention to the possibility of a canning or fish-smoking business built on the trout populations of the mountain lakes, but prospects for such development are not encouraging.

PERUVIAN FISHERIES INVESTIGATIONS

The steady growth of a fishery is always accompanied by an increasing need for knowledge concerning the effect of the fishery and of environmental changes on the populations of exploited fish. Such knowledge is required so that stocks of fish can be exploited wisely and not wastefully. Recognizing this fact, the Peruvian Government in 1954 created the Consejo de Investigaciones Hidrobiologicas and gave it the responsibility of coordinating and intensifying hydrobiological studies for the purpose of better utilization and control of natural resources. Representatives of the Navy, Guano Company, Directorate of Fisheries and Game, and the fishing industry constitute the membership of this body.

On 5 January 1956, by Supreme Decree No. 22, the Government established regulations for the issuance of permits to foreign vessels desiring to fish for tuna, skipjack and bait in Peruvian waters. By the provisions of this decree, foreign vessels must obtain both a Registration (valid for one year) and a Fishing Permit (valid for one hundred days) from either the Directorate of Fisheries and Game or from the Peruvian Consulate in the port of departure. Provision is also made for vessels on the high seas to communicate their desire for fishing permits by radio, the documents then being obtained at the nearest major Peruvian port. Registration is obtained at a cost of $200.00, and fishing permits require the payment of $12.00 per net registered ton.

Fishing in Peruvian waters must be carried on in accordance with various regulations administered by the Directorate of Fisheries and Game. Fishing vessels possessing permits may use Peruvian port facilities to obtain water, fuel, repairs, etc. and may contract for national personnel when needed to form part of their crew. All funds collected from the issuance of registration and fishing permits are by law deposited in an account called "Funds for hydrobiological investigations" which is to be used solely to support the research program of the Consejo de Investigaciones Hidrobiologicas.

This program is now being formulated under the direction of Dr. Warren S. Wooster of the University of California. The work will be done by the technical staffs of the Guano Company and the Directorate of Fisheries and Game, along with the scientists of the Consejo staff. At the beginning, the species of principal interest are anchoveta, bonito, skipjack and yellowfin tuna. For each of these species statistics are being collected to show the distribution and abundance of the stocks of fish as well as the location and intensity of the fishery. In order to interpret these statistics certain biological studies of the important species are being made. Furthermore, systematic oceanographic studies of coastal and offshore waters will be made in order to determine the nature and importance of changes in the ocean environment. Results of these studies will be made available to fisheries scientists and other interested persons.

Copies of pertinent legislation and other information concerning the operations of the fishing industry in Peru can be obtained from the Director de Pesqueria y Caza, Edificio Ministerio de Educacion, Piso 18°, Lima, Peru. Information on fisheries research in Peru may be obtained from the Director de Investigaciones, Consejo de Investigaciones Hidrobiologicas, care of the Direccion de Pesqueria y Caza at the above address.

Conulsa at Mancora—Shore plant in the foreground, with part of the fishing fleet and the freezer barge **Moquequa** anchored off the beach. Near section of the shore plant contains engine, compressor and store rooms. The adjoining building has freezing and cold storage facilities in the left portion, with the fish preparation and ice-making departments in the section with open roof. Dark are at the far right is the estero roof covering the net floor. Steel tower represents an unsuccessful attempt to establish a cargo-handling cableway over the surf.

Chapter VI.

Operating Problems in Peru

• Peru is a stern land physically, and lays severe restrictions upon industrial operations, whether they be on the coast or in the mountains; whether they be fishing, agriculture or mining.

Despite its situation near the Equator, temperatures are not excessive and do not constitute a primary handicap upon industrial operation — such as that which the extreme dryness of the coastal desert does on any business requiring water, as most businesses do.

Fishing operations often are located near the mouths of the small rivers, but water everywhere is at a premium, because agriculture has priority and irrigation works have drawn water from the streams since before the dawn of history. Many of the rivers never live to reach the sea, as all water is drained from their courses by diversions except during the rare freshets resulting from cloudbursts in the hills or melting of the relatively light Andean snowfall.

Even where water is available from streams or shallow wells it is not suitable for boiler use without treatment, for it is mineralized to a surprising degree.

To guard against water shortage, and in some cases as their sole supply, many plants have evaporators for making fresh water from sea water. Cleaver-Brooks distillation units are almost standard for this purpose. They are required particularly in freezing plants, where water used in contact with the fish, and particularly for glazing, must be of unquestioned quality.

• Transport is a primary problem for the fishing industry of Peru. This is a country of great vertical relief as well as horizontal distances. From the sea much of the coast rises in cliff and rocky headlands. There are few protected harbors, and those are small and shallow.

The second highest mountain system in the world parallels the coast, with only a narrow coastal bench between the sea and the Andean wall, from which rush torrents that have cut deep canyons running at right-angles to the coast. These gorges can

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be overcome only at great cost in treasure, time and distance.

Thus there is only one transportation line from one end of the country to the other — The Pan-American Highway. There is no railroad up and down the coast, although a few short lines run inland up the narrow valleys.

The highway carries a heavy volume of truck traffic, but it is only a two-lane road, dangerous at night, and hazardous at many points of river crossing, or where it skirts enormous moving mountains of sand on a sheer face which the sea is forever eating away below.

The one *sure* road runs by sea, but it is slow, and ports are few.

When you are at Ilo and want cans they must come by trucks from Callao, which is 700 miles away by road.

Haul-Out at Paita, with a modern ocean vessel anchored in the roadstead to receive cargo from lighters. Adequate ways and haul-out facilities for proper boat maintenance is one of the primary problems of the Peruvian fisheries.

• Harbors, or rather the lack of them, are among the most severe problems confronting the fishery operator in Peru.

Callao is a modern port, largely man-made; and Chimbote offers protection, but not over a large area.

A few fishing stations, like Samanco, have good protection for fishing vessels, but no facilities for deepwater freighters.

Lighterage is essential at most ports where ocean shipping is involved; and at some even the fishing vessels cannot lie alongside the piers, perhaps because there are no piers.

Under these conditions of exposed, compact coast, with almost no openings providing shelter, industrial fishery development would be almost impossible were it not for the fact that the Peruvian coast is quite free from storm. It is not host to hurricanes, and never visited by chubascoes and Tehuantepecers. The trades are there of course, blowing steadily, and sometimes stiffly, but Peru is not subject to gales — and therein lies salvation.

• Vessel maintenance provides a prime problem in the fisheries of Peru.

Most plants operate ways of some kind if they are at all isolated, but these will not handle craft of any considerable size. Seventy feet would be about tops for such facilities.

If the vessel is 150 gross tons or more, the entire coast of Peru offers no safe haul-out facilities other than the naval drydocks at Callao, and these are available only at the rare occasions when they are not needed for military craft. For a vessel to be laid up for weeks waiting for a few hours out of the water is not uncommon.

In northern Peru vessels occasionally can find haul-out accommodation at Guayaquil, in Ecuador, but here again luck has a lot to do with getting prompt performance.

• Here in all truth are essential keys to further growth in Peru's ocean fisheries—adequate ways, adequately spaced along the coast, and adequately equipped for repair and maintenance of fishing vessels of a size capable of supplying fish for enlarged operations.

The small boat haul-out ways with which most of the isolated canneries of Peru are equipped are only one aspect of the essential provision for maintenance. The plants themselves and their machinery, and the engines and deck machinery of the boats that serve them impose a demand load which may not be denied.

Beside its means for hauling out its fishing boats — and the scant tidal range on the coast of Peru forbids reliance upon gridirons for short-term boat work—the cannery must have a machine shop capable of servicing the engines for its fleet. It must be able to grind valves and replace bearings, weld heads and true shafts—or else be prepared to lose fish while its boats lie idle.

This problem of boat maintenance and machine shop facilities exerts powerful leverage for the standardization of engines within the fleets, a practice followed to a remarkable degree by Peruvian companies.

Do It Yourself is an essential in Peru, where repair facilities are hundreds of miles apart. Here Karl Just, right, master mechanic for Conulsa, checks a condenser repair job.

• Some plant maintenance facilities go far beyond the machine shop and welding machine.

Major canning plants will have electrical shops also, where motors are wound and batteries rebuilt.

Some plants even have foundries, where machine castings are made — and actually propellers.

Peru's Fishermen get

BIGGER HAULS
FASTER HAUL-INS
BETTER PROFITS

with "Bluenose" Purse Seines of High-Tenacity

DU PONT OF CANADA NYLON

Since their introduction in 1954, "Bluenose" purse seines of Du Pont nylon have proved increasingly popular in Peruvian waters. Here's why:

- They're stronger, carry more load.
- They last longer, are more resistant to rot and abrasion.
- They need no drying, no preservatives; can be stored damp without harm.
- They're lighter, more flexible, far easier to haul in.

For *maximum economy* and *top performance*, buy "Bluenose" purse seines of high-tenacity Du Pont of Canada nylon, manufactured by Dominion Textile Co. Ltd. (Drummondville Division) Montreal, Que., Canada. Sold and serviced in Peru by Jorge Neves V., Casilla 1466, Lima (Tel 45525).

DU PONT
CANADA

DU PONT COMPANY OF CANADA (1956) LIMITED

Textile Fibres Division

MONTREAL, QUE. — CANADA

This is a "make-do" business, where the ability to keep a plant in operation with what you have, or what you can make out of something else, is one of the most important accomplishments in a manager and his staff. You don't send a man out to operate a cannery on the desert coast of Peru without adequate repair and maintenance facilities any more than you'd send him out on that same desert without water and a hat to keep the sun off the back of his neck.

He'll need spare parts also; and the parts and supplies inventory at a remote cannery is an important factor in the whole investment. You can't get Lima on the phone and have a new gear at the plant by noon next day. Better allow two weeks, for it may have to come from Miami.

That's why the EPISA parts and supplies inventory at Ilo stands at a cost level of $350,000 all the time — and that's in dollars, not in soles.

• Communication is almost as much of a problem as transportation on the coast of Peru, but fortunately it is more easily solved—at a cost.

Remote plants of necessity have radio communication with their home offices, usually in Lima. Public telegraphic service is notably unreliable and few operators depend upon it except under the pressure of utmost necessity.

Most equipment will include *both* radiophone and code, for often the voice system is inadequate under tropical conditions. A few fleet units are equipped with radio, including all station ships; and this is a vital element in the successful operation. One manager put it thus:

"Communications are the key to success in this business here, and only the best radio sets are good enough. Junk sets are cheap, but you just can't afford them. I've seen communication failure cost me 15 tons of tuna in a single day. You can buy a lot of radio with 15 tons of tuna".

Primitive Net Floor—A Supe gillnetter mends his gear on the beach at the edge of the surf, with his boat beached just behind him.

Peruvian Management and Labor

• Peruvians manage—and man—the industrial fisheries of their country. Never forget that fact.

And they do it capably.

The staff at Consa—From the left, Carlos Otero Lora, managing director; Alfredo S. Fernandez O, administrator; Ing. Jaime Garagorri, superintendent.

Peruvian business methods and manners have a character and quality of their own, just as do the people of Peru, who are a serious folk, sober, industrious and modest. Business is conducted against a background of convention and tradition, where the direct approach may readily defeat itself.

The Peruvian businessman takes time to plan his course with deliberation and finesse, plus advice of counsel, and with throughtful weighing of all concerned, their acquaintance, connections and relationships.

The Peruvians have a proverb which can be translated something like this:

"The path to accomplishment leads through friendship".

It is a mistake to conclude that because some North Americans were active in the initial aspects of industrial fishery development in Peru that they exert majority influence in management today.

Actually, they exert ownership control in the case of only five of the 85 operating units on the Peruvian coast today — and two of those five are owned by the same concern. The foreign-controlled fishery companies in Peru today are all under American direction, with Canadian particiation in one.

However, it is not correct to assume that all North American interest in Peruvian fisheries is limited to four companies, for United States nationals at least have minority investments in a considerable number of others.

Furthermore, a number of the plants controlled and managed by Peruvians have United States, and sometimes Canadian or German, superintendents or plant managers. These men are essentially operating cannerymen, and they probably have Peruvian assistants who are learning fast. Almost invariably, foremen of the various phases of plant operation are Peruvians. in the mechanical and electrical divisions it is notable that the shop foremen very probably have had naval training, and plant superintendents and managers are quick to give the Peruvian Navy credit for providing much of the technological experience which has made it possible for Peru to mount an industrial fishery of world importance in 10 years on a cruel coast where until a decade ago the rich fishery resource was barely used except by the guano birds.

Feminine Net Crew at Chancay stringing plastic floats on the corkline of a new "Bluenose" anchovy seine manufactured in Canada by Dominion Textile Co. using nylon produced by Textile Fibres Division, DuPont Company of Canada. "Bluenose" nylon netting is widely used in the anchovy fisheries of Peru.

• A question frequently asked is: "How many North American companies have fishery operations in Peru? Which ones?"

The answers are plain and simple: Five — Wilbur-Ellis Co.; Star-Kist Foods, Inc.; National Marine Terminal, a subsidiary of Westgate-California Tuna Packing Co.; Archer-Daniels-Midland Co. of Minneapolis; British Columbia Packers, Ltd.

The Wilbur-Ellis Co. is associated in the operating field with Cia. de Negocios de Ultramar S.A., operating in frozen tuna, swordfish and shrimp in the north of Peru, with its base at Mancora.

Star-Kist Foods, Inc., has a Peruvian subsidiary, Star-Kist Peruana S.A., which is responsible for management of Star-Kist interests in Peru, which include part ownership in and management of Cia. Pasquera de Coishco S.A., with integrated operations at Coishco, near Chimbote.

British Columbia Packers, Ltd., just as this issue was going to press announced in Canada that it had taken a substantial position in the Peruvian fisheries through Empresa Pesquera Peru S.A., the Carl Hedreen enterprise, with canneries at Supe and Chimbote and reduction plants at those ports and also Huarmey.

Archer-Daniels-Midland Co. is associated with Peruvian interests in Cia. Ballenera del Norte, with a whaling station at Paita.

National Marine Terminal, associated with Westgate-California Tuna Packing Co., San Diego, operates Frigorificos Paita, S.A., which has a cannery and refrigeration plant at Paita and a freezer and reduction plant nearby at Tierra Colorado, "Red Rock".

It must be acknowledged that there is a general impression that the Wilbur-Ellis Co. is much more widely interested in Peruvian production than this would indicate. The facts are these:

1. The company through its Peruvian subsidiary Wilbur-Ellis Peruana, S.A., acts in its fundamental capacity as a sales agent for a considerable number of Peruvian fisheries companies, selling their products, canned bonito, fish oil and fish meal in export markets. It also does a general trading business in Peru, importing and selling a large list of products used in the country, and ranging from fish nets to engines, to frozen peas.

2. Some principals of the Wilbur-Ellis Co., as individuals, have private investments in some of the operating companies whose products are sold by Wilbur-Ellis Peruana S.A. In each case these interests combine to not more than a minority position in the companies concerned.

EXPORTS OF FISHERY PRODUCTS FROM PERU

[Shown in kilograms (2.2 pounds) and Soles (U.S. $0.0528)]

	1953		1954		1955		1956	
	Kg.	S/.	Kg.	S/.	Kg.	S/.	Kg.	S/.
Canned tuna in brine	220,800	1,883,945	220,729	2,188,301	78,386	649,640	34,240	271,281
Canned bonito in brine	581,541	3,754,725	790,868	7,093,081	...	...	...	...
Canned skipjack in brine	49,463	391,917	12,870	120,873	1,400	11,400	24,381	179,170
Canned bonito, natural	655,809	4,234,483	421,683	3,598,486	2,618,759	20,054,793	2,086,444	15,278,219
Canned tuna in oil	718,377	6,524,122	1,475,238	16,600,197	890,902	8,659,256	1,113,820	10,840,761
Canned bonito in oil	8,421,840	66,841,161	11,795,572	125,292,159	13,080,649	120,040,834	15,241,196	149,986,429
Canned skipjack in oil	46,004	387,249	1,755	21,851	39,000	400,464	...	...
Canned sardines in oil	6,362	118,752	...	...	138	2,300	110	920
Canned sardines in tomato	...	...	6,240	6,200	50,106	93,035	1,300	14,816
Frozen tuna fish	1,999,434	3,928,296	4,993,972	13,557,196	3,846,444	10,962,375	7,178,457	17,069,269
Frozen skipjack	3,382,061	6,785,981	5,872,817	16,708,079	7,412,507	21,125,626	4,901,396	11,616,990
Frozen swordfish	748,478	6,006,378	674,234	7,523,054	333,512	2,931,794	472,823	4,236,608
Frozen shrimp	151,114	2,509,488	230,571	4,291,906	217,741	3,050,349	163,012	2,234,837
Fish meal	10,608,817	16,184,308	14,040,428	22,571,410	18,767,656	37,910,232	27,791,660	17,210,959
Fish oil	142,634	333,063	295,283	515,003	92,317	185,266	1,720,716	4,356,871
Whale meal	200,800	378,442	647,288	1,318,429	500,333	1,141,235	1,130,325	1,658,431
Whale oils	3,551,920	7,028,629	5,017,874	13,452,299	4,743,033	13,519,926	4,277,638	13,787,095
Miscellaneous	1,300	11,311	964	57,798	37,714	141,184	321,244	718,015
Total	31,530,902	127,340,375	46,499,826	234,927,981	52,710,594	240,879,709	66,458,762	249,460,671

Modern, Integrated Episa Operations

on the Rocky, desert coast at Ilo, southernmost port in Peru. Hospital in the foreground. Of the six gable ends in the plant, the two on the left are cold storage; the three with cupolas cannery; that on the right can loft and warehouse.

• Peruvian labor is proving thoroughly adaptable to the industrial processes of food packing.

Wage scales are low, and so is productivity. Quality of workmanship, on the other hand, is good; and the people learn readily.

As a matter of fact, it has been upon the basic ability of Peruvian labor to learn, to follow instructions, and to produce a pack meeting high-standard specifications that much of the growth of the Peruvian canning industry has been built.

The British market evidenced a good deal of interest in the early samples of Peruvian bonito, but demanded firm fish, uniform color, smooth, careful filling without loose flakes in the oil. Plant labor was educated in the requirements of "English grade", and its success in meeting this high quality earned for the industry the premium which the British market pays for goods fully meeting its demands.

Before industrial fishing began in Peru there were at least 5,000 fishermen who drew their living from the sea and supplied the coastal towns with fish. The problems of keeping and transporting fish under tropical desert conditions necessarily restricted the scope of their markets. Further, scarcity of materials for boat construction kept their fishing close to shore and its rare shelters. Most of the primitive craft were rafts of reeds lashed together, or of balsa logs, which must be brought from Ecuador.

One notable exception to the generalization that coastal Peruvians did not develop as dedicated fishermen is the men of Sechura, a tiny port in the lee of a great cape at the ocean edge of the Sechura desert, the widest, deepest area of the Coastal Desert of Peru laced by no green, irrigated valleys. Here in Sechura the populations turned to fishing in prehistoric times, and followed the sea more devotedly than elsewhere along the 1,400 miles of what today is the Peruvian coast. Sechurans are fishermen born, and every boat owner today hopes to have one as the *patron* of his vessel; and proud is the craft with a full crew of the fishermen from Sechura. Their home port has fallen far behind others, so far as fishing is concerned, due to the lack of adequate transportation, but it still is the cradle of Peru's finest fishermen.

What About APRA?

• The answers one receives to this question when it is asked of Peruvian businessmen are very different from those produced by the same question posed in American academic circles; and the impressions of APRA gathered in some thousands of miles of travelling in Peru bear scant resemblance to those purveyed by some American journals of news and interpretation. Where such publications are apt to consider APRA as a very liberal, even radical, socialistic party, they usually are quick to clear it of connection with Soviet Communism.

Such clearance is not commonly given in Peru, where men are in better position to be fully informed on the subject than they are on Rockefeller Plaza. In Peru the businessman will tell you—if he has reason to trust you—that APRA is a beautifully camouflaged Communist culture planted in the most vigorous and the most strongly capitalistic economy on the west coast of South America.

In its origins APRA was probably only an extreme left-wing party designed to attract the Peruvian Indian; but it appears to have been infiltrated, captured and converted into an effective tool for World Communism, albeit while its membership, and perhaps much of its leadership, is ignorant of the fact that it is being so used.

The fiscal policies of APRA and its prophet, Haya de la Torre, brought Peru to the verge of economic disaster in 1948. The Peruvian fishing industry, just then beginning, suffered bitterly, but rallied with the national economy as the government rejected the Apristic program and outlawed APRA as a political party.

Through the years the Peruvian fisheries have gained strength and stature in no small part because exports were freed of insupportable controls, and because the national administrations were dedicated to free economic principles.

Exports of fishery products, currently in fifth place among Peru's foreign sales after minerals, cotton, sugar and oil, have contributed substantially to the national stability which in its turn has made fisheries' growth possible.

• APRA today again is accepted as a political party, and is beginning its climb back to power, centering its efforts essentially in the far south, where the $200,000,000 expenditure of the Southern Peru Copper Corporation to develop the world's greatest prospective copper deposit creates a surplus of jobs, a transient labor force, loose money, and the conditions where designed-to-destroy social systems thrive and grow dangerous.

They take APRA much more seriously down there, for they see more of APRA and hear more Apristic murmurings, than they do in Lima.

In the capital men say: "APRA and all its stands for are utterly repugnant to the personal philosophies of the great majority of Peruvians. The only danger from APRA lies in the indifference of the people as a whole to what they consider a crackpot cult. Under the shelter of such indifference, it is possible for even a scant minority to become powerful. Remember: 175 Spaniards once conquered all Peru and overthrew the Inca Empire".

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Now available to fit a broader range of applications. Now the best marine Diesel is even better than ever—ready to give your boat faster speed with more power in less space. It's the time-proved GM Series 110 Diesel, newly equipped with a side-mounted blower similar to the one used on the famous 71 Series. It's a more compact engine, shorter, lower, easier to install and maintain.

If you're planning to buy a new boat—or re-power your present one—get the power you need and the performance you want from this new Series 110. It's also available as a Tandem *Twin* that delivers up to 440 *shaft* H.P. for work boats—yet weighs as much as ten tons less than older Diesels of lesser power.

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This new Diesel Series 110 marine engine is a leader in work output per dollar.

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GM GENERAL MOTORS DIESEL POWER

Small bonito seiner slips his lines in the crowded harbor at Callao and gets ready for sea and another catch. It was mid-morning and he expected to be back in time to discharge his fish and have dinner at home.

Chapter VII.

The Fleet for Tomorrow

• Peru built its fishing fleet in 10 years 1947 to 1957—and it's getting ready to build another.

It will be composed of vessels more adequate in character, able to carry more fish faster; able to take more fish quicker; able to stay at sea longer; able to earn more money easier.

The fleet is ripe for change, but it won't come all at once. The shift will be more gradual, as the *patrons* and the crews they command come to appreciate the potentialities of the few new boats which are being introduced into the fishery.

• Before the beginning of the industrial phase of Peru's fishing history at the end of World War II the fleet was composed of small, primitive craft, few with power.

To build a fishery it was necessary to build a fleet, and to train Peruvians to fish with purse seines. There grew up along the Peruvian coast a motley fleet in whose lines and rigging, trim and sheer could be traced many national origins. In it one can see Adriatic aspects, traces of Trondhjem, Bergen and Stavanger; lines from Labrador; accents of Biscay and the Baltic; and here a clipper bow from San Francisco, a seiner stern from Tacoma, and cross-braced shrouds which could have come only from Burrard Inlet.

As the pioneers of Peru's industrial fishery struggled to build a fleet they brought plans from American architects, but local builders followed them only in a general way. The Wilbur-Ellis Co. introduced a set of plans by H. C. Hanson, Seattle naval architect, covering a successful Puget Sound vessel. Some 35 craft were built from these plans, but the family resemblance is dim indeed.

By and large, Peruvian fishing vessels of the present are "day boats", not equipped with living quarters, and designed to return to port at the end of each day's fishing.

• As forerunners of the more capable fleet of the future, a number of venturers have brought vessels from the United States to Peru to fish and also to serve as demonstrators to interest Peruvian fishermen in the potential of large vessels with greater capacity and greater comfort.

Experienced observers of Peruvian fishing believe "Alaska limit' 'seiners, with their overall length of 55 to 57′ and their ability to serve in many trades, as seiners, trawlers, long-liners and even bait boats, would be ideal for the requirements of bonito and anchovy fishing.

Some larger craft have been brought down to Peru to pioneer the fishery which depends upon refrigeration to protect the quality of caught fish, and which plan to remain at sea until they take a full load, Such, for instance, are the 84-foot *Sun Star*, launched at Tacoma in 1946 as the *Sea Traveller*, and the 87-foot *Cavalieri*, built in Antioch, Calif., in 1935.

Vessel types in Northern Peru: on the left a tuna seiner, built to plans by H. C. Hanson, Seattle naval architect; center, a typical swordfisherman.

European builders are not prone to let the Peruvian fleet-to-be pass to American yards and architects by default. For example, Oscar Bahr of Norway by April, 1957, had sold several 55-foot Norwegian-built trawler-seiners to Peru, where they were offered powered either with General Motors or Deutz diesel engines.

For the most part, Peruvian operators expressed the opinion that the coming fleet would largely be built in Peru, but from plans developed elsewhere and proven successful in the fisheries of Europe or North America. It is perhaps significant that the Orient is rarely or never mentioned as an influence in the fisheries of Peru. Japanese advances have been received coolly, and the once-considerable Japanese population has not returned to the country from the protective deportations of World War II, which Peru was the first of South American republics formally to enter.

Hitherto fishing boat construction costs in Peru have been low, although materials and equipment have been costly. Type of boat required, cheap labor, minimum of conveniences, combined to keep the costs very low in a boat that was "good enough".

Moreover, the lack of adequate facilities for maintenance, coupled with the acute conditions of corrosion and fouling inherent in tropical operations, made the life of a boat short; and "good enough" did not need to be very good.

One Peruvian expressed it thus: "In the North you build heavily, of prime materials, and you are able to maintain your boats in good condition for many years. A boat may outlive two, possibly three, engines. Here the situation is reversed. An engine may serve several hulls."

Obviously, with the coming of the new fleet, which seems inevitable, this condition will be broadly changed. Vessels of the kind contemplated by the forward-looking operators will represent an investment in construction and materials and equipment which cannot be treated so casually. Maintenance facilities capable of keeping these larger craft in top condition are almost as essential as the boats which will use them.

Seiners Dominate

Purse seining is the dominant form of fishing on the coast of Peru, whether it be for tuna, bonito or anchovy.

Although there is some crossing-over from one fishery to another, the boats generally fish one or the other of these species. They may thus be divided into types according to the fishery in which they specialize.

Tuna Seiners — This fishing is confined almost wholly to the northerly and westerly extremity of the coast, with the fleet working out of Mancora and Zorritos. Tthe tuna boats generally fall into two size classes, 45-50 ft., and 55-60 ft.

Nets used will vary slightly in length and depth with the size of the boat, minimum dimensions approximating these:

Length 280 to 300 fathoms, 28 to 30 fathoms deep. Twine in the main body of the net is 27-thread, with 42 and 48-thread in the bunt. A very heavy 60-thread leadline strip. Mesh is 4 or 4½ in. In anything larger than this the Skipjack would gill badly, and they comprise from 60 to 75% of the tuna catch—the balance being Yellowfin.

Purse lines are manila and the webbing may be nylon, marlon or cotton. While cotton has dominated the tuna fishery during its early years — and very excellent cotton netting is made in Peru of the fine, long-fiber domestic cotton—the synthetic materials are growing rapidly in their use. Floats used on Peruvian seines of all types were largely of synthetic materials by the middle of 1957, and complete conversion from cork to plastic was anticipated in the coming months. Spongex floats are virtually standard in the industry.

Howard Riley, Conulsa manager, spends much of his time afloat. That's where the fish are found. He's pictured here on the bridge of one of the seiners delivering to the plant at Mancora.

Bonito Seiners — These vessels are slightly smaller than those specializing in tuna, with length ranging from 38 to 50 ft., averaging about 45 ft. Nets used average about 250 fathoms length, with 20 to 26 fathoms of depth. Mesh is almost universally 3½ in., with 15 or 18-thread usually used

in the body of the net, although twine as heavy as 24-thread is sometimes used. The bunt is heavy in contrast, 48 to 60-thread.

For obscure reasons, bonito seines are usually of cotton, the synthetic fibers having made little headway in this fishery.

Anchovy Seiners—Singularly, these boats are the smallest of the seiner division, despite the fact that their nets are heavy and their loads large. Boats are 35 to 45 ft. in length, and modern anchovy seines are 130 to 135 fathoms in length and 20 to 24 fathoms deep. All are of tiny ½ in. mesh with nylon twine approximating 4-thread and marlon 6 to 9-thread.

Synthetic fibers have made much more headway in anchovy gear than in Peruvian seines for tuna and bonito. In fact, almost all anchovy gear is

Arnulfo Rosales, "patron" of the shrimp trawler **Mike King,** regarded as one of the leading fishermen in the shrimp fleet of northern Peru.

synthetic, either Japanese marlon, Du-Pont nylon or German perlon, in that order of frequency. The fishermen apparently prefer marlon in these small-mesh nets, saying that the knots are much easier on their hands, while the nets appear to sink more promptly than those of unblended nylon.

When cotton nets were used universally for anchovies the life of a seine was counted from six to eight months, due to the extreme conditions imposed by climate and the difficulty of caring for the nets.

Today there are documented cases in which nylon anchovy seines are in their third year, with no prospect of failure. Actually, one fleet superintendent reported that no nylon nets had yet been in use long enough in the Peruvian fishery to provide data as to their life under the conditions prevailing.

Fish Pumps at Coishco, with an anchovy seiner pulling in with a light load. The modern Peruvian plants with pier facilities generally unload anchovies by means of pumps.

Number of Boats — Approximate number of purse seiners engaged in the fisheries of Peru, including tuna, bonito and anchovy, is 350 vessels of all sizes from about 35 to 87 ft.

Powered vessels of other types, particularly swordfishermen, bait boats are trawlers, and including a few powered gillnetters, approximate the same number, giving a total powered fleet of about 700 craft.

Official sources fix the number of unpowered vessels engaged in the Peruvian fisheries at 2,400, of which about 350 are reported as sailboats and the balance as "dories", doubtless being craft driven entirely by oars and ranging from balsas to the large double-ended gillnetters which account for a substantial part of the bonito production at some points, notably Supe and Callao.

Gillnetters—Gillnet fishing in Peru is confined almost wholly to bonito, a fishery which it dominated until the purse seiners eventually emerged as the favored form of gear. However, out of Callao and Supe for some obscure reasons the fishermen have remained faithful to the old gear, which is responsible for a large percentage of the bonito landings at those points.

The bonito boats generally are about 25 ft. in length and some are driven entirely by oars, while others use small inboard motors. The nets used are of cotton and are fished at night, generally in the immediate vicinity of the port.

It does not appear that nylon gillnet has been fished seriously for bonito in Peru, nor has any attempt been made to apply power to hauling gillnets. Observers familiar with the Puget Sound-Fraser River type of reel gillnetters — and their success with nylon nets—are inclined to the belief that such a combination of boat, equipment and gear would be highly effective on bonito. They would not of course overcome the giant squid problem, but would appear to merit a trial in spite of this factor.

Harpooners — Swordfishing, which was perhaps the first element to attain industrial status in Peruvian waters, depends entirely upon harpooning. Spearing is the oldest form of human fishing, and to this day has never been improved upon as a means of taking Swordfish.

The boats used in this fishery are small flush-deck double-enders, 30 to 32 ft. long with a tiny house over the engine hatch and the identifying mark of swordfishermen the world over, a "pulpit" or *botalon* fixed to the bow, and with an iron rail at its extremity to protect the harpooner as he leans far out and thrusts his harpoon into the basking "sword", called in the north of Peru *pez espada,* and in the south *albacora.*

Trawlers — Fishing with trawls is confined to the vicinity of Callao, Paita and Caleta Cruz, the latter points being in the northerly portion of the coast.

There are two fisheries in which draggers engage: for market fish, and for shrimp. The market trawlers work out of Callao and Paita, or actually Tierra Colorado nearby. They land a variety of fish, notably *corvina* and *linguado* for delivery by trucks to markets in population centers of the vicinity.

About 10 to 12 trawlers of varied size and type are engaged in this fishery at Paita, with a somewhat larger fleet working from Callao.

Among the hazards of Peruvian fishing to gear, and even to boats, are the fantastic numbers of fish-eating birds which inhabit the coast and compete with the fishermen for an-

Boat Maintenance Problem is ever-present in Peru. Needing a plank to fix their boat, two fishermen get it this way in the Conulsa repair shop at Mancora. Most lumber comes from the United States, although Peru has enormous hardwood forests in the Amazon basin beyond the wall of the Andes.

chovies. Sometimes a flock of these birds will gather about a boat as it is drying its net with a heavy catch of anchovy and, diving into the net and becoming gilled in the meshes, may force splitting the seine and dumping the catch in order to save the gear. There have been many cases of lost nets, and even of capsized boats, as result of prodigious numbers of diving birds being caught in the meshes under water and drowned. On one occasion three boats struggled for most of three days in an effort to save a net loaded with birds.

Gear Operation

• Fishing methods in Peru have evolved, as the fleet has evolved, from many national origins. Out of this process have come hybrid practices which, regardless of their mixed derivations seem to work well under the conditions encountered.

Methods are changing, nevertheless, and will continue to change with the development of the new fleet with its specialized designs. The Peruvian fisherman is an individual firmly fixed in his ways. He follows more readily the success of others than he does orders. Innovators seeking improvement in fishing methods and effectiveness have found that instruction and persuasion produce less lasting advance than the quiet introduction of a vessel, a net, an item of equipment, manned by those familiar with it and capable of proving its value in fishing the Humboldt Current. Casual demonstration is quick to produce demand for the means of duplication.

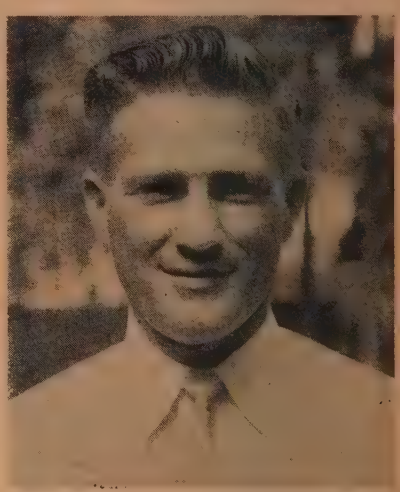
The Puretic power block is a case in point. It would appear perfectly suited to Peruvian operations, and may be counted as one of the factors which will force the coming of a new fleet of more capable craft, for any fisherman can see that with it a small Peruvian craft of today's type can catch more fish in a day's operation than it can carry to market. In the case of the small anchovy boats with their heavy nets there is some doubt if the existing craft have sufficient stability to use a power block in conventional operation at the boom point. The alternatives are two: provide larger, more stable craft, with larger carrying and earning capacity; or devise means by which the advantages of the power block can be applied at a point and in a manner which will not impair the stability and seaworthiness of the typical anchovy vessel.

• Gear research in an effort to develop means of catching fish — particularly anchovies—during the months when they are largely unavailable to conventional gear and methods occupies the attention of some of the forward-looking Peruvian operators.

A premium is put on the development of such off-season productivity by the current edict against increased numbers or capacity of reduction plants beyond the present year, and until biological research has devised means of measuring the abundance of the anchovy population, detecting its fluctuations, and appraising the health of the resource.

In short, if no more plants can be built for the time being, and hourly capacity of existing plants may not be increased, there is special reason for development of means for catching fish during the months of the year where they are not available to conventional gear. As it is now, most of the reduction plants are closed for three or four months of the year, May through July or August. If substantial quantities of fish could be taken during during this period it is obvious that the economics of anchovy operations would be materially brightened.

One method being investigated on the possibility that it might produce such off-season catches is mid-water



William Melzer, fishery engineer for Wilbur-Ellis Peruana S.A. is particularly interested in the introduction of modern methods, vessels and gear into the fisheries of Peru.

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Modern Gear plays a prominent part in Peruvian fisheries, which have been quick to adopt such improvements as these Spongex plastic floats, shown here on the Conulsa net floor at Mancoa, nylon, perlon and marlon synthetic netting. These men are working on tuna seines.

trawling. This form of fishing has been tried already, and one Peruvian company is known to have plans for construction and operation of an Alaska limit seiner fitted with a purse-trawl winch of the North Dragger type, stern set trawl stanchions, and other facilities necessary for mid-water trawling.

This kind of fishing is favored because fishermen and operators agree that in all probability the anchovies merely retreat to deeper horizons or isotherms during the periods when they are not available or near the surface.

• Electronic instruments, particularly echo-sounders and radio-telephones, have been slow to gain a place in the Peruvian fishing fleet; nor has this hesitancy derived from cost or lack of suggestion on the part of the operators, who in large part own or control the vessels. They simply have not been able to interest the fishermen in the employment of such devices. Here as in the case of the power block and other innovations, it is anticipated that successful example eventually will bring the fishermen to demand the magic equipment. How long will that be? Men close to the problem of producing fish in Peru think it will be several years before the Peruvian fishermen will be ready for radiophone and echo sounder, but when they are the conversion will be complete, and will be translated into tonnage immediately.

• Ownership of most of the power vessels comprising the Peruvian fishing fleet rests with the operating companies. Exceptions to this broad rule are concerned principally with gillnetters, minor craft, and the Chimbote seiner fleet, which is largely owned by independent operators, fishermen and investors.

While there are various arrangements between boat-owning businessmen and the boat-working fishermen, as a general rule the boats are provided by the company for which they fish, either through direct ownership or charter.

The fishermen are paid on a wage basis, plus a bonus based on fish delivered. A *patron* is in charge of the boat.

Gear also is furnished by the operating company.

Trend in fishing boat power is definitely toward diesel today, after general earlier preference for gasoline. Fuel cost is not a major item in Peru, where gasoline and oil both are available at prices which make an American fisherman envious. Experienced fleet operators say the swing away from gas engines toward diesel is prompted in large degree by the arduous service to which the boats are subjected, with long stretches between overhauls, and in the care of experienced engineers. Conditions on the coast of Peru put a premium on dependability and the ability to slug along with a minimum of care.

American diesels are far in the lead in installations and preference in the Peruvian fleet, but European makes provide constantly sharper competition.

Among the American installations noted, Caterpillar and General Motors seemed to be running neck-and-neck in the lead, with Cummins, Enterprise, Buda, P & H, International, Atlas, and Union diesels represented.

Among the European diesels. Deutz seems to have the numerical advantage in installations, perhaps due to the number of Deutz air-cooled diesels which have been installed in the fishery centering at Ilo in far southern Peru. Others include the German M.W.M. and the British Lister. There are some Canadian Vivians.

• What may one expect in the Peruvian fishing vessels of the future?

Only a reckles man tries to read the future, but on the evidence one might anticipate that the next few years will see a Peruvian fishing fleet consisting of vessels something like these:

Purse seiners — Similar to "Alaska limit" vessels, from 55 to 57′ overall; 50′ l.w.l.; breadth, 15 to 16′; power diesel, 100 to 150 hp.; Peruvian-built of wood, with some tendency toward steel; fishing with a power block, probably used without turntable, but with a seine skiff; equipped with adequate pumps; instrumented with radiophone and echo-sounder.

Gear — Seines of marlon or nylon blended with other synthetic fiber or Peruvian cotton; synthetic floats; manila lines; some chain lead lines and wire purse lines.

Gillnetters—Vessels of 28 to 32′ in length; built of wood in Peru; powered with gas engines or quite possibly small diesels; equipped with power reels and fishing nylon gillnets.

Other Types — Due to the adaptability of the "Alaska limit" purse seiner to other gear, it can be anticipated that Peruvian purse seiners of the future will be capable of mounting trawls, whether bottom or mid-water, and even longlines, if that form of fishing proves effective on further test.

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Icing a Tuna Vessel of the Pesquera Mancora fleet with 300 cakes of ice carried from the road down a steep bank and across the beach to the skiff, which will be rowed through the surf with three cakes aboard to the vessel anchored offshore, where the ice will be man-handled onto the seiner. The little girl is hoping a piece of ice will be broken off. Note the men on a balsa in the background.

Chapter VIII.

Peru's Fishery Plant—

Its Character, Costs, Labor, and Methods

•Peru's fishery plants, canneries in particular, compare favorably in character with the North American average.

There are none so large as some of the great establishments in Southern California and British Columbia; and there are some which perhaps are smaller than you will find in the United States and Canada — but size is not the prime criterion.

The physical character, design, arrangement and equipment of the Peruvian canneries, freezers and reduction plants is good. In many cases they have been planned and built by accomplished and experienced engineers and technologists from the United States and Canada. Many have been outfitted with machinery which had rendered effective service in California, until the disappearance of the sardine population made the equipment available for moving to Peru, where a great new fishery was building.

True, there is great weakness in the area of fish landing and handling between the boats and the plants — but that results from the physical characteristics of the Peruvian seacoast, the lack of harbor, the exposed roadsteads, the bottomless sand, or the impenetrable bedrock.

These problems of fish handling from boat to plant are under attack, and their inevitable correction may well represent the next great forward thrust of an industry whose goal is growth.

• Comparatively few Peruvian fishery plants have unloading and fish-receiving facilities that can be counted wholly satisfactory, and the handful within this fortunate group are those situated on small protected bays where they can have their own small docks —plants like those at Coishco, Samanco, Casma, Chancay, Paita and Red Rock.

Problems of delivering reduction fish are rapidly being resolved by the introduction of unloading pumps, including the "Monterey type" of installation where the fish are brailed by the boat into a floating hopper anchored beyond the surf and connected with the pump and plant by a large-diameter submarine pipeline.

Where piers are possible, unload-

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ing increasingly is done by means of modern fish pumps which draw the anchovies from the vessels' holds and deliver them to the plant by flume or pipeline.

Consistent gains are made, but there is much ground to be won in this field before the shore facilities of the Peruvian fisheries can be counted as wholly adequate.

• Only fish in the freshest possible condition could withstand the multiple handling to which it must be subjected at many Peruvian plants—and therein lies one of the essential elements which have made some operations possible on this exposed coast. The other is cheap labor.

Thus, where fish has been out of the water only a matter of an hour or two, and where men work for little, is it possible for a modern fishery plant to operate without port or dock, hoist, pump or pipeline.

No fish benefits from much handling, but fish at the freshest can take it.

Along with the new fleet of bigger, better boats Peru's fisheries of the future will have better, faster, easier methods of landing and delivering the catch. That's about as certain as a forecast can be.

Filling Bonito at Ilo—Character of employes, their workmanship and product, compare favorably with fish packing anywhere.

• Peru's fishery plants fall into five distinct categories:

1. *Large, fully-integrated plants:* with cannery; refrigeration for service to the cannery if not for production of frozen fish for sale as such; and reduction facilities.

2. *Medium-size specialized canneries,* often with a reduction division;

3. *Small canneries,* usually without reduction;

4. *Freezers,* packing tuna, swordfish and shrimp for export in frozen form;

5. *Reduction operations,* often called "fish meal plants" in Peru in recognition of the small part which fish oil recovery plays in this business.

Plant construction generally is good and substantial, and usually of materials and design well suited to operating under the peculiar conditions prevailing in Peru where, unlike most tropical coasts, rains is rare, if not almost unknown.

Thus some plants actually are open to the sky, being literally without roof. This type is common among reduction plants, many of which consist of a concrete floor surrounded by a high wall of concrete or adobe blocks, which serves the double purpose of protection against pilfering and against wind-driven sand.

Some canneries are constructed after this same general design, but usually with an overhead covering of "estera" matting to shade the fish and the cannery workers alike from the ardor of the sun.

Plant walls generally are of concrete blocks, brick or adobe faced with cement stucco. Much use is made of "transite", corrugated asbestos fiber cement sheets for sheathing and roofs. Steel is rare. As a matter of fact, the extent to which concrete substitutes for steel is among the distinct features of Peruvian fishery plant construction. In many places where steel would be standard in North American plants, such as fuel and fish and water tanks, concrete is employed. Reinforcing steel is light and used sparingly, but this is made up in weight of construction, the concrete sections being heavy in the extreme.

• Sanitary construction prevails throughout the industry. Floors are always of concrete, always well drained, well-washed.

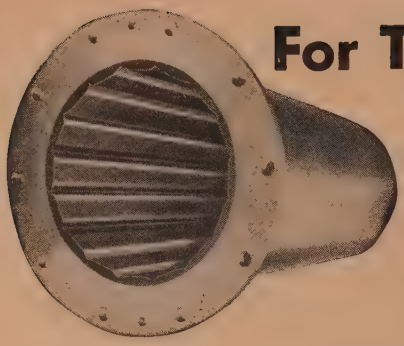
Flies are much less prevalent than might be expected, and in many plants are adequately excluded by screening and controlled by exterior spraying. At Ilo, for example, Empresa Pesquera Ilo, S.A., and Morrison-Knudsen Co. and Utah Construction Co., contractors for the Southern Peru Copper Corporation, share the cost of fogging the entire area of Ilo twice a week with a malathion-based insecticide. The venture is astonishingly effective.

Water supply is an ever-present problem. Most of the isolated fishery plants are located near the outlet of one of the little streams which come down from the mountains through irrigated valleys, where much of their flow is drawn off for agriculture. Wells usually are counted upon by the fishery plants, but the supply of water is variable and the quality poor for steam purposes. In most cases it is highly mineralized and must be treated fully to fit it for boiler use.

In some cases canneries supplement their supply of fresh water with sea water compression stills. Cleaver-Brooks equipment is virtually standard for this service. Evaporation not only provides water suitable for plant use in emergency, but is essential in furnishing safe distilled water for use in freezers for washing fish and glazing it after freezing.

"Home-made" equipment serves in a number of Peruvian fish canneries—and remarkably well. Some of the smaller outfits — and not always the small ones — have improvised retorts and conveyors, packing tables and fish reduction equipment, out of the minds of their superintendents and their mechanical staff. The isolation, poor transportation, and pressure of necessity for keeping up with the fish in a tropical climate put a premium on the "make-do" ability of managers and superintendents.

• Plant power is almost universally diesel-generated. One interesting exception is at Casma, where Cia. Maritima Pesquera relies for its primary



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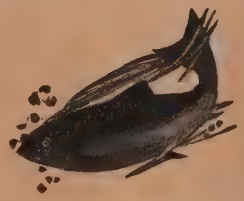

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power on German steam turbine turning an electric generator, with the low-pressure steam going to the cooker and Schlotterhose steam dryer in the reduction plant. Stand-by, however, is a Caterpillar d.g. set. Indeed, Caterpillar diesels seem to have a long lead in Peruvian fishery plant power houses.

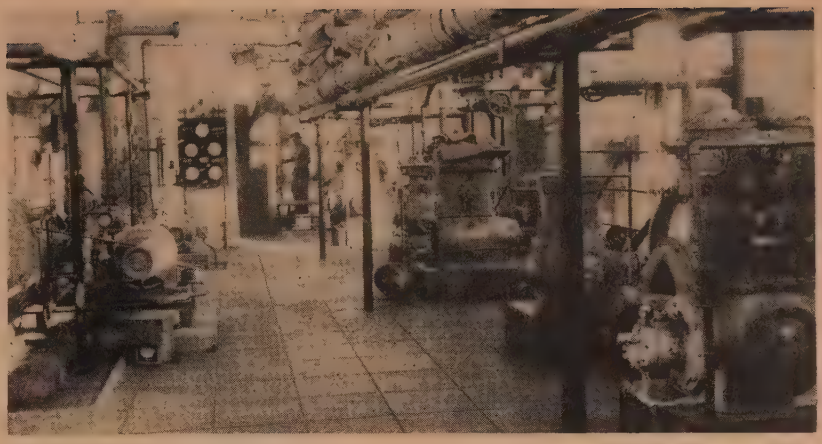
Considerations in Canning

• Bonito are purchased traditionally by the dozen. Price is more or less fixed for the season. In 1956-7 it was 35 soles per dozen until the end of March, when packing for the United Kingdom was suspended.

Paradoxically, with the close of canning for this preferred market, the price rose sharply at Chimbote, the index market. Why this should be was entirely obscure, as the fish were running out of condition and the demand for the product which could be packed from them was easier. Nevertheless the price rose to 45 and even to 47 soles per dozen, to the great dismay of some of the operators. Later, with lower canned fish prices a certainty, raw bonito price in May and June dropped as low as 18 soles.

Buying by the dozen is traditional practice which the industry generally deplores, as it requires a tallyman for each delivery, and fails to compensate for variations in average fish size.

Bonito generally run from 3 to 3.5 kilos, 6.6 to 7.7 lbs., round. Fish averaging above 4 kilos are decidedly unusual.



Modern Equipment marks Peruvian fish-packing plants, which compare favorably in quality with the average anywhere. This is the compressor room of the cold storage at Coishco, which freezes 50 to 60 tons daily and can store 2,000 tons of frozen tuna and bonito.

With fish of this size, it is to be expected that recovery would be rather low. Average yield per *metric* ton is said to be 33 cases of halves.

The great majority of Peruvian bonito is marketed in halves, although there has been a definite increase in the percentage packed in quarters for the British market. The third can size commonly packed is the 1-lb. tall, in which the bonito loins are carefully packed on end *in two layers* and in brine for the United States' institutional trade.

Canning practice follows tuna canning with no significant variation.

Pre-cooking in baskets averages 2 hours, 15 minutes. Cooling is accomplished in 24 hours despite tropical conditions, because of the ever-blowing trade wind.

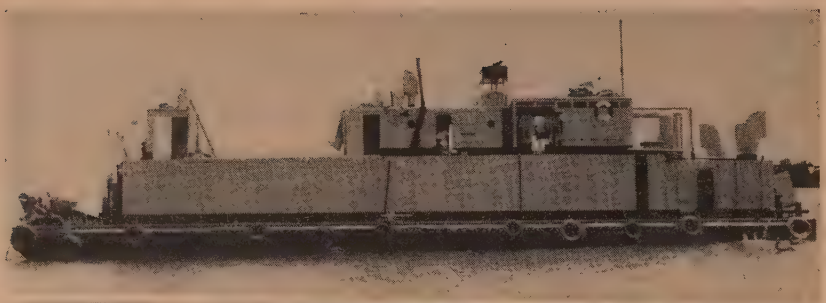
Preparing the loins is done thoroughly, and perhaps with more wastage of light meat than is altogether necessary. In contrast with tuna, including Skipjack of comparable size, bonito are notably tender and soft in texture. They must be handled carefully to avoid breakage, while the loins are of course small in section and prone to break up if roughly handled. Peruvian plant labor, however, appears quite careful and willing to take pains. Payment is by the hour, but the product of the fillers is scrutinized by inspectors and poor work is not tolerated. By dint of thorough instruction and regular inspection, the industry has met the stringent specification of the British market, the goal of every operator in Peru.

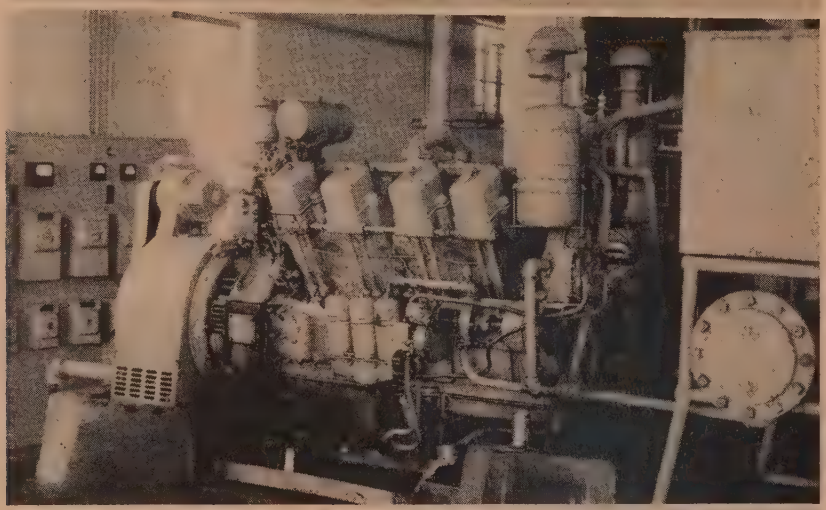
• Natural rock salt, of which many massive deposits occur on the coast of Peru, is generally used in canning, where it proves quite satisfactory.

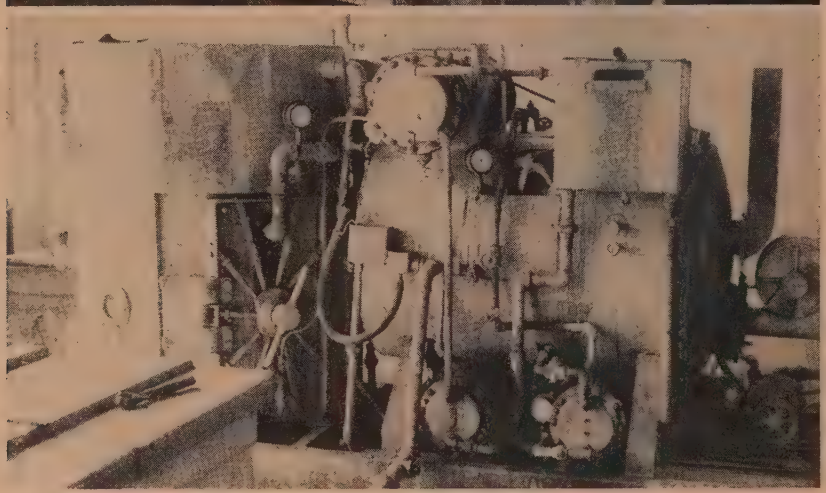
Cotton being Peru's largest agricultural crop, it is natural that bonito should be canned in refined cottonseed oil, which is processed in two modern plants and is of the highest quality. It is interesting that, despite the very large production of cottonseed and other edible oils, Peru does not have an exportable surplus of vegetable oils and requires that firms which export oils — as contained in canned fish — must import an equal amount of oils for Peruvian consumption.

• Vacuum is particularly important in Peruvian bonito, as the hold temperatures of vessels carrying cargo in the Equatorial regions can rise very high. To provide the high and certain

Pesquera Humboldt's cooker and press division is shown in this general view. The helical conveyor draws anchovies from the pit and delivers them to the hopper from which they are divided between the cookers of the two California Press units. Foots screen and press on the left. This is the first Peruvian plant to install a "Monterey type" floating hopper for pumping anchovies ashore.







Exacting Problems of operation on the north coast of Peru are countered by the Conulsa equipment shown here: **Top**—Freezer barge **Moquegua** lies offshore and freezes fish to obviate its being carried twice through the surf in skiffs. She can store 250 tons of frozen fish. **Middle**—Power must not fail, and dependability is at a premium. Thus these Caterpillar diesels deliver the power on which the operation lives. **Lower**—Water there must be, and for washing and glazing tuna, swordfish and shrimp it must be pure. This Cleaver-Brooks compression still makes fresh, pure water from the sea for plant use.

vacuum required, oil is added to the cans at 180°, and the filled cans pass through short exhaust boxes before final seaming. Accepted vacuum requirements are 4.5 in. for halves and 3 in. for quarters.

In this journal's study of the industrial fisheries of Peru only one vacuum closing machine installation was observed, a 1-lb. tall seamer at Samanco.

Large majority of cans used in Peruvian fish canning are of local manufacture, and generally are trucked to the plants from the two factories located at Callao. There is one exception, at Ilo, where collapsed cans are brought from the United States and reformed in the cannery after the system employed in Alaska salmon canneries. The collapsed cans are received direct at Ilo by ocean freighters, while domestic containers must be trucked from Callao, a distance exceeding 700 miles. Cans from both sources are employed.

Processing of Peruvian bonito departs slightly from tuna practice in the flat arrangement of cans for process cooking in place of the jumble method common in tuna canning. While the random basket method was employed in Peru at one time, it has since been virtually supplanted by level arrangement of the cans for cooking. In most canneries the retort baskets are still employed, but one end has been cut away and wire baskets containing two layers of half-pound cans are stacked in them for retorting. Purpose of course is to assure that no portion of the fish in the can is without adequate protection from overheating during cooking and cooling periods.

All retorts employed in Peruvian fish canneries are equipped with modern thermometers, most of them of the recording type.

• Premium price commanded by "English pack" naturally encourages operators to secure just as much of this grade as possible. "Chunk pack" thus far has been virtually unkown, although substantial quantities of bonito flakes are processed, primarily for the United States market.

Machine filling has not yet entered the Peruvian canneries to any significant degree, although two filling machines were seen in the course of *Pacific Fisherman's* study in 1957. One of these, as yet inactive, was a Davies machine at Ilo, where it was in the process of being modified to meet the specific problems of bonito packing. The other was a Pak-Former, the Carruthers machine for filling chunks and flakes, installed at Coishco.

• Cost picture in bonito canning presents some interesting aspects for the operator elsewhere. While it is obvious that there will be some variation of costs with location, size of cannery and its degree of integration, the data here presented may be taken as reasonably representative. They are cost figures for a small-to-medium cannery, with reduction plant, at a rather remote location on the Peruvian coast. They are given in soles, which were current at U.S. $0.0528.

DIRECT CANNING COST PER CASE OF 48 HALVES

Item	*Soles*
Cans and case	38
Canning oil	10-11
Fish	20
Labor	10-12
Total	78-81

Charges for overhead, interest and storage are not included in this data.

Valiant Lady—Steel seiner designed and constructed by MARCO

Puretic Power Block. Peruvian Ptd. # 4012.

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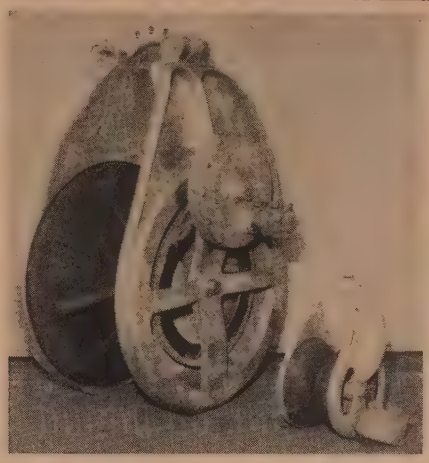

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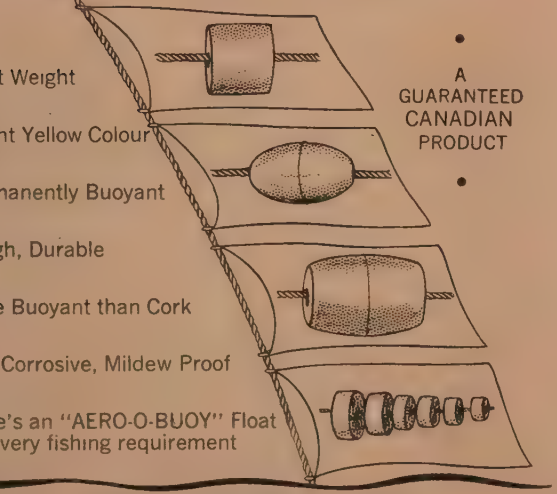

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Mother's Little Helper on the bonito loin preparing line in the Figuerola cannery at Chimbote. Peruvian women frequently work all day with babies slung on their backs.

Other Canned Fish

• Bonito dominates the entire field of Peruvian fish canning, and this to an increasing extent, as it appears there is a downward tendency in the packing of other fish products in spite of the need of the Peruvian people for additional supplies of protein which abound in almost limitless quantity in the sea along their country coastline.

In point of volume, the principal Peruvian canned fish other than bonito unquestionably is "herring" or "machete", packed in 1-lb. oval tins with tomato sauce, after the manner of California sardines. It should be emphasized that these fish are not herring, nor are they even closely related. Scientifically they are *Ethmidium chilcae*. They run from 9 to 11 inches in length, about the same as a California pilchard sardine, but are deeper in body, and somewhat more compressed.

In Peruvian canning these fish are dressed, trimmed in length to fit the can, pre-cooked, drained, sauced and processed.

It is interesting to note that these fish, canned in tomato sauce after the manner of California sardines, are known on the Peruvian market as "Portola", this deriving from the brand name of the Hovden Food Products Corporation, Monterey, Calif., whose "Portola" sardines in tomato sauce at one time were exported to South America in considerable quantities. In time the Hovden brand actually became the generic term for Peruvian "herring" canned in a similar manner.

• Minor quantities of other fish products also are canned, anchovies packed sardine style in quarter-oil tins appearing to have best potential as an export item.

These little fish are ideally suited for this pack, as size of the Peruvian anchovy approximates that of Norwegian brisling. It is questionable however if they could be labelled "sardines" in the United States market, as they fail to meet the "clupeoid" qualification which American governmental definition requires of fish for labelling as "sardines".

Refrigeration in Canning

• All of the larger Peruvian canneries, and some of the medium-capacity group, are equipped with auxiliary refrigeration facilities designed primarily to serve the cannery function of the plant, rather than to freeze fish for marketing in that form.

As in other fishing regions, there are frequent occasions when the rate of delivery of fish exceeds the capacity of the plant to care for it immediately. Under tropical conditions facilities for meeting this glut situation become particularly important; while the ability of a cannery to protect the prime quality of even normal deliveries of fish for a few hours may yield worthwhile economic return, not only in securing premium quality but also perhaps in enabling plant operation to conform to optimum schedule.

Peruvian canneries' refrigeration installations fall into two general types;

1. Those designed to freeze surplus fish and hold it in storage until such time as dearth in deliveries requires it in the cannery.

2. Provision for temporary storage of excess deliveries for a short period, protecting fresh quality of relatively limited surpluses for a few hours until the fish can be accommodated. Fish are rarely actually *frozen* in this system, which may involve chiling in low-temperature storage rooms or in tanks of refrigerated sea water or brine of comparable salinity.

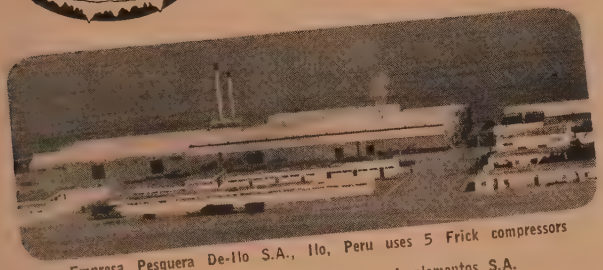
The most recent installation in Peru is a brine tank installation of the latter type, closely resembling installations in California and Alaska canneries.

Freezing Plants

• With a few exceptions, all located in the extreme north, Peruvian fish freezing plants are elements in inte-

Compromise between tuna retort baskets and salmon coolers is in use at Ilo, where cans two-high in cooking baskets are retorted with a minimum of handling and shaking. The workman is typical.

FRICK means "DEPENDABLE REFRIGERATION"



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Olsen-Johns Ship Chandlers
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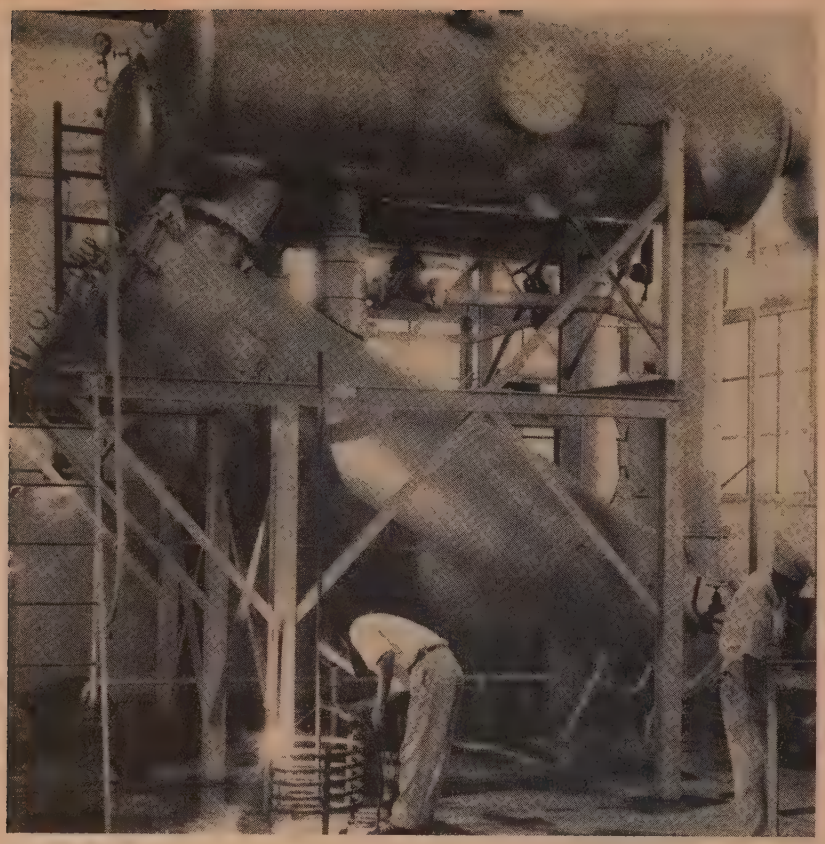
Alfred Puusti & Company
238-240 West Marine Drive
Astoria, Oregon



Pioneer Concentrator, the first equipment in the Peruvian fishery for producing condensed fish solubles from reduction plant stickwater. This is a two-stage Atlas-Stord unit manufactured in Denmark. Its product is returned to the presscake to increase meal volume.

grated operations, where they serve to supplment canneries as well as to freeze fish for export in that form.

Principal export frozen fish operation is concerned with tuna for export to the United States for subsequent canning. Swordfish follows in importance, with shrimp as a fast-climbing newcomer, and the only product now exported in packaged form.

Peruvian fish freezers generally are of modern design and equipment. Unhappily, in the interest of low first cost, too much reliance has been placed in cheap, locally available insulation materials, notably rice hulls and charcoal. These materials provide excellent insulation while dry, but require the best of vapor barriers, installation and construction if they are to remain effective over a period.

Freezing methods are sharp freezers and air-blast.

Fish freezing in Peru has its special problems. One is water. As water for washing, ice for chilling, and particularly water for ice-glazing comes in contact with fish reaching the consumer without heat sterilization, it is requisite that the water be of unquestioned purity.

On the Peruvian coast fresh water of any kind is scarce enough, and at some points where fish are frozen actually is not available in any significant quantity. As result, seawater distillation units are practically essential. Cleaver-Brooks compression stills are virtually standard equipment for this service. They provide about 1,750 gals. per unit daily at a relatively low cost, thanks to the cheap price of fuel oil in northern Peru, where the International Petroleum Corporation operates the only significant oil field on the west coast of South America and Mancora, two of the principal approximately half-way between Paita fish-freezing installations.

Another problem of Peruvian fish freezing concerns loading frozen fish for shipment. Some of the freezing stations have not pier facilities whatever, making it necessary to take the frozen product through the surf, or to freeze and store it aboard freezer barges located outside the line of breakers. This latter practice is the more common.

Freezing plants share with canneries the prime advantage of receiving their fish within a few hours of catching, with the opportunity of processing it in the freshest possible condition, which contributes importantly to the excellent reputation which Peruvian frozen fish and shrimp enjoy among foreign buyers.

Reduction and Whaling

• Peru's newer anchovy and whale reduction plants rank with the finest in the world.

Currently, anchovy reduction is the most actively expanding element in the industrial fisheries of South America, with numerous new plants being installated in 1957. This is due in part to haste in conforming to the requirement of the Peruvian government's order that only reduction plants authorized and completed before the end of 1957 would be allowed to operate until such time as the extent and condition of the anchovy resource can be evaluated.

Economic yield of the reduction industry has been good, although the price of meal—on which it must be dependent almost entirely — suffered sharp decline early in 1957.

Many of the older reduction plants —and some being installed in 1957— have done duty in the sardine industry of California. A number of the plants once active at Monterey and on San Francisco Bay were purchased and moved to Peru after sardines disappeared from California waters.

Current installations of new, unused machinery for reduction purposes show a preference trend for European equipment in a number of important categories. This is probably due in some degree to the fact that Peruvian fish meal — and oil also — finds its principal market in Europe, with Germany the leading buyer.

The European trade prefers a light-colored meal which has been dried at low temperature by low-heat methods. German, Danish and Norwegian fish reduction machinery is designed primarily to manufacture meal meeting the European preference.

Construction of many Peruvian reduction plants is distinctive in that they consist only of walls, equally without roof or windows. In a land where rain is almost unknown, a reduction plant needs no roof, and is much easier to ventilate if it has none. Heat is dissipated more quickly, and the sun can lend a powerful hand with the drying. The walls of this roofless construction serve to balk the pilferer and to keep out sand driven by the ever-blowing Trades.

• A feature of Peruvian fish reduction operations which bewilders the stranger familiar with this operation on other coasts is the open air storage of sacked fish meal. Where there is no rain there need be no shelter. Sacks of meal fresh from the dryer and grinder are stood on end in the open, spaced a few feet to permit the wind to sweep away spontaneous heat, and the

sun to provide a double-drying. Meal may remain thus for weeks undamaged, and actually not even threatened, although care must be exercised to provide ventilation and guard against spontaneous heating.

• Manufacturing methods are in all respects modern and progressive.

Fish pumps are largely employed wherever piers are possible; and Monterey-type floating hopper installations with underwater pipelines delivering fish through pumps are just coming into use at points where sea and bottom conditions make the installation of piers impracticable.

Peruvian anchovies press well, being much superior to those of the Pacific Coast of North America in this respect, although this may be due in some degree to the relative leanness of the tropical fish, from which only 2 to 3% of oil by weight is recovered.

With the exception of one P & L disc press, all units observed by *Pacific Fisherman* were of the screw press type, variously California Press, Standard Steel, Enterprise, Atlas (Danish), and Schlotterhose (German).

Press liquor separation generally is done by centrifugal means, DeLaval, Sharples, Westphalia and Titan centrifuges being noted. Some installations depend on settling tanks for separation.

Meal drying follows several patterns. Most of the installations brought from California are of the direct-heat type, with some steam-tube equipment. In the case of European equipment, the steam-jacketed system seemed to be preferred, with its low-temperature drying, light colored, high digestible meal. Capacity of such equipment generally was low, however, and the cost laid down in Peru was somewhat higher than new American machinery of comparable capacity.

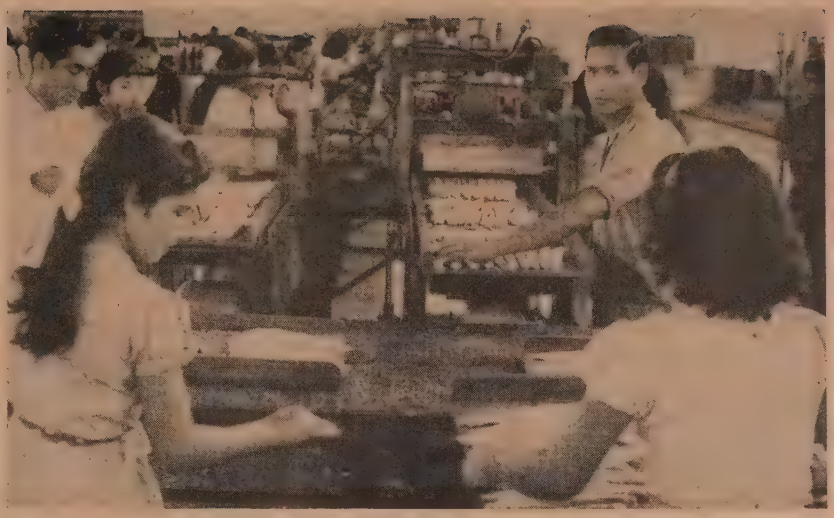
There are three whaling stations in Peru, one at Chancay, one at Pisco and the other at Tierra Colorado. "Red Rock", near Paita.

The latter was under construction when visited and was not scheduled to get into production until the latter half of 1957. It was most modernly equipped with British and Norwegian whale reduction machinery, including batch cookers and digesters. Its concrete pier is perhaps the largest and most adequate installed by any fishery plant in Peru. This operation is Cia. Ballenera del Norte, a subsidiary of the Archer-Daniels-Midland Company of the United States.

These whaling operations depend primarily on sperm whales, the species specially abundant off the Peruvian coast. Preference of sperms for the waters of the Peruvian Current was noted and reported by the American whaling fleets out of New England more than a century ago. That preference still persists and Peruvian coastal waters are among the most dependable source of sperm whales known to Man.

Why should this be? Peruvian fishermen think they know the answer: the Giant Squid.

For many years whalers have recognized that some great squid must be among the favorite food items of the sperm whale because of the number of squid beaks found in the stomachs of sperm whales. With the Peruvian Current sometimes alive with the Giant Squid, the fishermen's theory that the sperms are there to seek the squid seems reasonable enough, although it might not satisfy the scientist.



Peruvian Canning of bonito follows closely accepted practice in the tuna industry of the United States, after which its procedures were patterned closely. The loins, trays, guillotines—all but the Pak-Shapers—are much the same. This picture is in the Figuerola plant at Chimbote.

Sanitation

• Report on the operational aspects of the industrial fisheries of Peru would not be complete without attention being given to the subject of sanitation, always a touchy one, but one which should not be—and in this case need not be—avoided.

The experienced examiner of canneries who knows how and where to look and smell will find little to complain of in the plants of Peru. In some of them he will find much to praise.

Early in the history of the industry there was much room for improvement, and actually great change has come about since 1952, when a determined effort was made throughout the industry to raise standards above the point where any exception could be taken. This has largely been accomplished.

Actually, flies are not abundant; and modern spraying outside the plant serves to control them well. Some plants are thoroughly screened, and more are following.

Fresh water for washing fish is never abundant, and sometimes must be stinted. Modern automatic chlorination equipment would appear a justifiable investment, and has been installed at Coishco.

Personal cleanliness and habits of the cannery employees appear comparable with those of Alaska salmon canneries, and some plants in the United States.

• One possible point of complaint lies in the practice of trucking bonito from delivery points to distance canneries for packing. While the distances travelled are not greater than many over which fish are trucked similarly in the United States, the Peruvian operator depending upon this practice has two special problems: the scarcity of ice on that coast; and the tropical temperatures.

On the testimony of competent and critical observers, bonito appear to possess exceptional resistance to bacterial or autolytic deterioration, as well as the ability to undergo truck transportation without damage.

The great majority of Peruvian bonito, however, are canned from fish delivered to, or close to, the cannery itself, and within a few hours of catching—sometimes within an hour.

Herein lies the greatest of all contributions to sanitation and product quality—fresh fish. *That* is the prime essential. Once lost, it cannot be regained.

In the exceeding freshness of the raw material reaching its canneries, as well and in its abundance and inherent high quality, lies the great asset of Peru's industrial fisheries.

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Peruvian Fish Products Exports By Country Of Destination

(Shown in metric tons, equivalent to 2,200 pounds.)

CANNED FISH

Countries — Years	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
United States	1,959	3,176	4,664	5,700	7,653	7,642	9,604	8,052	9,025	9,471	7,467
Canada	..	325	20	..	..	149	453	532	522	491	570
Switzerland	50	210	149	196	523	430	707	487	544	160	57
England	..	..	..	..	..	..	330	301	3,268	4,982	8,254
Belgium	..	523	16	66	167	479	711	743	676	504	434
Other Countries	643	377	22	237	379	295	860	793	685	1,101	1,719
Total	**2,652**	**4,618**	**4,871**	**6,199**	**8,722**	**8,995**	**12,665**	**10,708**	**14,720**	**16,709**	**18,501**

FROZEN FISH

United States	..	..	712	2,601	9,106	8,111	8,171	5,223	9,025	10,670	12,440
Other Countries	..	..	..	10	..	253	..	943	5,695	871	282
Total	..	..	**712**	**2,611**	**9,106**	**8,364**	**8,171**	**6,166**	**14,720**	**11,541**	**12,722**

FISH MEAL

United States	..	474	675	2,708	3,540	6,048	9,026	10,198	11,869	8,390	6,361
Other Countries *	..	..	..	..	202	3	70	411	2,171	10,378	21,431
Total	..	**474**	**675**	**2,708**	**3,742**	**6,051**	**9,096**	**10,609**	**14,040**	**18,768**	**27,792**

* Mostly to Holland and West Germany.

Chapter IX.

Markets are Paramount

• Markets are the key to the future of Peru's fish canning industry.

Existing plant, afloat and ashore, fleet and factory, is capable of producing more high-grade canned bonito than presently developed markets can absorb at prices profitable to producer and distributor.

Apparent bonito population, exploited by a more effective fleet serving enlarged canneries furnished with improved fish-handling and boat maintenance facilities, could fill the orders of far greater markets than the industry enjoys today, yielding Peru an attractive increase in foreign credits.

Notice that we are speaking of Peru's *canning* industry; and specifically of bonito.

Market problems of the freezing and the fish reduction industries are nominal or non-existent; and the matter of markets for minor products of the canneries, or of canned items not now developed, are domestic problems, tied tight to the economy of Peru.

Of the markets for frozen tuna, swordfish and shrimp, for fish oil and fish meal, we shall think later. Now we are discussing the Peruvian fisheries' central problem:

How to sell more canned bonito profitably?

Behind it, but associated closely with it, is a secondary problem with some grim implications:

How to protect the markets Peruvian bonito now enjoys?

• This is not the first time Peru's packers have had marketing problems. Twice before they have faced threatening situations and mastered them. It was done by grim determination, intelligent analysis of the nature of the problem, and realistic acceptance of corrective cures.

First of these market crises came early in the history of Peruvian bonito canning when the product, labelled "Bonito", was held-up by the United States Food and Drug examiners, who contended that it should be labelled "Tuna". This decision was complied with by the somewhat bewildered shippers, and for some time the Peruvian goods entered the United States, principally at New York, under "Tuna" label.

For a time there was no particular argument. Great Britain accepted samples as "Tuna"; and, after all, there was a substantial body of scientific opinion which held that Bonito was a Scombroid fish of a genus as close to classical "tunny" as some fish commonly labelled and accepted as Tuna. Taxonomists varied, as they invariably do. After all, it was a matter of opinion.

• Then developed an interesting drama of trade and tariff.

California canners noted the growing imports from Peru of canned fish packed from bonito and labelled "Tuna". They canned a closely-related bonito and labelled it as such. Formal protest against the labelling of Peruvian bonito as tuna was lodged with the Food and Drug Administration.

At the time it did not seem a matter of great importance. Tuna canned in oil paid an import duty of 22½%; while bonito in oil paid 21%.

In the course of time the United States authorities reversed themselves and decided that the Peruvian commodity canned from bonito, and which they had originally required to be labelled "tuna", henceforth would be "bonito".

It appears that this reversal was based on the contention that, as California canners for many years had

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...America,
where people do not
inquire of a stranger,
"What is he?"
but
"What can he do?"

—Benjamin Franklin

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been canning *Sarda lineolata* as "bonito", historical precedence had been established for the commercial classification of this genus as "bonito" rather than as "tuna", and this precedent should rule in United States practice.

About this time the import duty on tuna canned in oil doubled from 22½% to 45%; and a few months later, Oct. 7, 1951, the duty on bonito canned in oil declined from 21% to 15%.

This chain of circumstances really set the Peruvian bonito packers up in business so far as the United States market was concerned. The protest which prevented their product from entering the United States as tuna came soon to save it from paying the 45% duty, and actually won it a tariff reduction to 15%.

Volume of imports of bonito into the United States from Peru shot up almost 50% in 1952, the first year in which this new tariff alignment was applicable.

Thus was the first market crisis for Peruvian bonito passed. Success was not all due to the industry's wit, true enough; but it was not marred by false moves.

• From the very beginning of Peru's post-war fish canning growth, efforts were made to attract European buyers to bonito. Progress was slow and interest scant.

In the first place, Italy was about the only country which used much tuna, and it packed most of its own requirements. Moreover, Peruvian bonito did not substitute readily for the kind of tuna Italy and the other Mediterranean countries were accustomed to using. It was light in color, softer in texture, bland in flavor. For "tonno" the Mediterraneans want darker tuna, Bluefin preferred, solid in texture, rich in flavor.

In the United Kingdom, however, the product aroused a ripple of interest.

In the first place, it was attractive; or could be made so if uniformity could be achieved.

Secondly, it came from a national source from which imports were not controlled nor exchange permits required.

Finally, if the United States market had come to consume above 10 million cases of tuna annually it was only reasonable to believe that British demand for a substantial volume of this interesting Peruvian product could be developed.

Britain was interested, but only if its specifications could be met, fully and consistently.

What were they?

Insulated Trucks at Fripsa's "Norpac" plant at Red Rock deliver fresh trawl fish landed there by a fleet of 10 trawlers to the markets of cities in northern Peru. Ice for fish transport is made from fresh water distilled from the sea by Cleaver-Brooks evaporators.

It is doubtful if the specifications of "English pack" were ever successfully set down in writing. Degrees of color, of smoothness, of firmness are difficult to describe without recourse to the equipment and the techniques of the physicist. Specifications and qualifications for "English pack" came to be defined primarily in the minds and memory and understanding of experienced inspectors and examiners in the United Kingdom, the United States, and Peru.

Beside the usual requirements of sweetness and soundness and cleanliness, "English pack" tuna, as Peruvian bonito is legally labelled and commonly called in Britain, must be:

1. Of uniform pinkish color, neither white nor brown, with almost no color variation within the can, and little between cans.
2. Definitely firm.
3. Smooth in appearance within the can, with a minimum of voids between the pieces.
4. Without flakes or bits of fish free in the oil as the can is opened.

• To meet these specifications was the second of the Peruvian industry's challenging market problems, and it was solved cleanly. The hundreds of thousands of cases of canned bonito which Peru sells in Britain each year are testimony to the extent of this success. It did not come in a day, or with a word. Months of instruction, years of insistence, persistent inspection and firm rejection were required. Moreover, the scrutiny, the instruction, the encouragement are continuing things, which may not be relaxed.

The stake is high, a premium price averaging in the neighborhood of $1 per case for "English grade." There are minor modifications, such as goods which cannot quite qualify as "E" on the examiner's score sheet, but may be given "E-2".

"English grade" is what the British market wants, but not necessarily what appeals to Peru's other best customer, the United States. There a somewhat darker color is altogether acceptable—for the consumer is well-acquainted with light meat tuna; and slightly softer texture finds no objection where the housewife buys most of her tuna in "chunk" style, and where she puts a premium on the fuller flavor of mature bonito.

Top grade designation for the United States market is the inspector's "SS" rating, an abbreviation drawn from the initials of "Southern Star", prime brand of the Wilbur-Ellis Company in the United States market, and the brand under which is sold a very large percentage of the Peruvian bonito marketed in the United States.

Indeed, the Wilbur-Ellis Company accounts for distribution of a very large percentage of the Peruvian canned fish, whether in the United States as bonito or in the United Kingdom as tuna. In the British market the Wilbur-Ellis Company since 1951 has been working with Anderson & Miskin, Ltd., exporters, of San Francisco, Seattle and Vancouver, B. C., who represent the British canned food distributing houses Pelling, Stanley & Green, Ltd., and Angus Watson & Co., Ltd., which pioneered the distribution of this commodity in Britain, where their "John West Middle Cut" brand is a leader in canned fish selling.

Other active Peruvian sellers—and British buyers—have entered the field, certainly; and volume has grown with their advent.

Inspection and Certification is provided for the Peruvian canning industry and its customers by the Food Industries Laboratory. At the top, one of its field inspection teams with Donald F. Roberts, managing director, wearing hat. The inspectors, from the left: Nestor Rondon, Feliciano Garcia and Juan Sagarbarria. In the lower view Rondon and Garcia inspect while Roberts inspects a parcel of fish and J. Alberto Valle, manager at Samanco, watches with interest.

• Peruvian bonito finds a limited export market in countries other than the United States and the United Kingdom, notably Belgium, France and other countries of Western Europe.

Immediate prospects of substantial growth in those areas are not regarded among Peruvian sellers as particularly bright.

Competition in U.K.

• Market studies in the United Kingdom convince Peruvian producers that Britain's consumption of tuna can be expected to increase substantially beyond present levels. While the rapid growth manifest in the latter half of 1955 and through part of 1956 may not be sustained, gradual year-to-year increase in British tuna buying appears within realistic expectation.

Convinced of this, the Peruvian producers today are primarily concerned with this question: Whose tuna?

Hitherto, Peruvian tuna has been without a direct competitor in Britain. The problem thus far has been one of merchandising, of building a market; not one of competition and getting a profitable share of business.

This year Peruvian producers find that the currents of change have brought a competitive factor into the British market. This is Japan, with its vast ability to pack tuna and sell it cheaply.

• Since the re-birth of Japan's tuna industry following World War II, and particularly as they saw Peru building a market for its tuna there, the Japanese have looked longingly at the possibilities of the British market. They were well acquainted with its potential, and with its insistence upon product specifications, through many years of supplying a substantial part of its canned salmon requirements.

Success of the Peruvian industry in developing a market in the United Kingdom stimulated the Japanese interest; but Japan was in the dollar exchange bloc and import permits were required for its products. No permits were being granted for tuna. Peruvian supplies came from a non-permit area, and were adequate for the demand. Thus the answer to Japan's persistent application for tuna import permits to Britain was negative, year after year—until the spring of 1957.

Then Britain approved exchange permits adequate for about 200,000 cases of tuna in halves from Japan. This is equivalent to perhaps one-third of the recent Peruvian business — enough to present an immediate marketing problem, and a more serious one for the future, *if* the Japanese tuna proves appealing to a British market which has been nurtured from birth on the product of Peru.

The Japanese could be expected to make the most of their ability to appeal to the British predilection for appearance, and price.

Peruvian producers are frankly concerned, seeing themselves face-to-face with a new and formidable marketing problem.

United States Potential

• Seeking the market expansion which is essential to the growth of their industry, Peruvian bonito businessmen analyze the United States' potential intelligently and with painstaking scrutiny.

Over the years this market has taken much more than half of their output. Can it be expected to buy more yet?

In the past this business has been satisfactorily profitable. Of the past two years or so realizable prices have come down perilously close to costs. Can the space between them be expected to broaden sufficiently to yield an attractive profit once more?

The North American consumer has come to think of Bonito as a substitute form of tuna, attractive primarily from the standpoint of price. Has Bonito built for itself the most economically attractive position available to it in the United States food market?

These are some of the findings from distributive studies, with further questions which they raise.

• From their thoughtful consideration of these findings and further questions, Peruvian principals appear to be inclining toward industry effort to improve and extend Bonito's position in the United States market through product promotion and advertising designed essentially to estab-

Examination in the Technological Laboratory at Callao tests an experimental product. Luis Zamaeto S., laboratory chief, is examining, with Carlos Sotomayor of Star-Kist Peruana looking on.

lish Peruvian Bonito as an imported canned fish product with an identity of its own, resembling tuna, true; but differing from it in origin, in color, in texture, and slightly in flavor.

In short, they visualize a broader future for Bonito in the American market as a distinct product, rather than as a substitute for tuna featured primarily on the basis of lower price, which may carry with it certain undertones of presumed inferiority.

• Here is another marketing problem for the Peruvian packers, a problem which they appear to be grappling with insight and determination.

Reports of American canned fish distributors from various markets in the United States tend to verify the thesis that Peruvian Bonito can develop an identity of its own and convert it into demand and sales.

Responding to *Pacific Fisherman's* inquiries, distributors have said that where Peruvian Bonito has been featured as such in limited local advertising there has been a definite and immediate demand for it by name — "Bonito"— as well as by brand; but that such advertising programs have not been extensive or sustained, with the result that their advantage has been temporary and the demand they stimulated short-lived.

Other Products' Markets

• Markets for Peru's frozen fishery products generally are in sound condition, and likely to remain so; although the market in the United States for frozen tuna from South America necessarily must follow the currents set in motion by the supply of fish landed by American vessels, together with that resulting from the vastly greater volume of frozen tuna reaching the United States from Japan.

Frozen tuna enters the United States without paying duty, and the amount of it purchased from Peru unquestionably is tied closely to that produced by the United States domestic fleet, plus that purchased from Japan.

Swordfish ranks second among the frozen fish exports from Peru, and here the market is strong, for Peruvian frozen swordfish is recognized as the best to be had in the world market. As such, and with a consuming demand which normally runs ahead of production, trade is limited by supply rather than market.

Shrimp apparently knows no market limits, and certainly this is true of shrimp of such astonishing size as the individuals which make up the relatively limited volume thus far produced in Northern Peru. For such shrimp there are no market problems: today, or in prospect.

• *Meal and Oil* are commodities in world trade to a degree which puts them in a different market category from canned and frozen fish.

To a large degree their marketability and prices are dependent upon world supplies of fats and oils and protein supplements.

Peru produces fish meal comparing with the finest manufactured anywhere in the world from the standpoint of color and digestibility.

The product has a head-start in its race for markets in the world commodity competition in fats and oils and protein feeding concentrates.

Chapter X.

Science and Research

Biology, Oceanography, Technology, Inspection, Control

• Science has an almost unlimited field of opportunity in the abundant life which comes into being in the Peruvian Current.

The biologist perhaps is most concerned, for his is the science of life itself, and these resources of the sea are living creatures.

Oceanographers recognize the Peruvian Current as one of Earth's great manifestations of hydrodynamics.

Meteorology credits the Current with shaping the climate and the weather of thousands of miles of coast in one of the most dramatic anomalies of the Equatorial regions.

Chemists find in the complexities of fish oils and proteins challenges which their racing science is only beginning to accept.

Man's remarkable gains of the past decade in utilizing the resources of the Peruvian Current have run essentially along technological and commercial lines. Given an opportunity to develop their natural resources, and being under the necessity of doing so without subsidy or bounty, Peruvian businessmen have devoted themselves to that development along lines tested in other lands — where for the most part they must sell their product.

These men are strong individualists, and the national policy encourages growth through strength and courage and the willingness to risk. In other countries and other times this kind of a free-wheeling enterprise has led to waste and impaired resources, depletion and decline. As they came to use industrially the resources of the sea. Peruvians had before them the examples of the halibut, the Sockeye salmon, the fur seal, and even their own guano deposits.

They have sensed the need for science, for research before depletion of their "limitless" resources makes it evident once more than not even the life of the sea is inexhaustible.

Through their government they have provided means by which the technological aspects of their industry can be studied, sound practice protected, new products developed.

Good businessmen that they are, they know that the good name of their product is an ingredient as fundamental as anything which goes within the can. Thus the business provides product examination and certification through an independent food products laboratory whose inspection and rating are accepted by buyers in

all countries to which Peru sells its canned fish.

Sea Science

• Biologic and oceanographic study of the coastal waters of Peru is the primary objective of the National Hydrobiologic Council, which entered into a new phase of its existence in 1957 and as this is written is concerned with the development of a basic program upon which its scientists can build a body of knowledge of the Peruvian Current and its living resources.

The Council is composed of representatives of the Peruvian Navy, the Guano Corporation, the National fisheries authority and the fisheries industry of Peru. It assumes and conducts all former research responsibilities of these agencies, beside developing a program of study of broader character.

Financial support for this research is derived from the license fees paid by foreign—principally United States —commercial fishermen for the privilege of fishing for bait fish and tuna in Peruvian waters. Thus fishermen of other countries, whether they are fishing in territorial waters of Peru or in the high seas beyond, support scientific studies which contribute to the whole body of scientific knowledge of the fish they utilize, the measurement of the resource and its abundance, determination of changes before they become dangerous, and the dynamics of the marine populations inhabitating the Peruvian Current.

Direction of the research program of the Hydrobiological Council has been placed in the hands of Dr. Warren S. Wooster, an oceanographer from the staff of the University of California's Scripps Institution of Oceanography. His appointment results from an agreement between the Hydrobiological Council, the Scripps Institution and the Inter-American Tropical Tuna Commission, under which Scripps will train Peruvian oceanographers and will give leave of absence to staff members chosen to conduct Peruvian research studies. In exchange, the Institution will receive oceanographic data collected by the Peruvian agency.

First project to be undertaken by the Council's research scientists will be an oceanographic study of the northern boundary of the Peruvian Current, particularly with respect to seasonal variations in its character and location; and particularly the conditions producing the aberrant oceanic conditions in this region known as "El Nino".

Research in this region is of particular interest to the Inter-American Tropical Tuna Commission, as it is in this sector of the Pacific that the principal South American coastal occurrences of tuna are noted. The commission has been maintaining a scientific investigator in the northernmost segment of the Peruvian coast for some time.

Research director for the Hydrobiologic Council is Dr. Warren S. Wooster, scientist on leave from the Scripps Institution of Oceanography, University of California.

The Peruvian research is directly related as well to the Pacific Oceanic Fishery Investigations of the United States; and in a more general way to all of the investigative enterprises of the world's scientists in the field of the sea and the living creatures which inhabit it.

• To have the opportunity for research at this juncture in its fisheries development, with the wit to seize that oportunity, Peru enjoys particularly favorable climate for its germinating science and study of the sea which sweeps its shore.

Here biology is able to study populations in their full bloom, rather than those which have been dangerously depleted. Here is an opportunity to determine the optimum utilization of the resource in such a way that Mankind may make the fullest use consistent with sustained yield from year to year; and use which may in fact increase gross productivity by moderating the conditions of over-population which may actually result in increment to the stock.

In short, the physician has the chance to study a healthy patient and to devise means of keeping him well; rather than to cope with the perilous problem of saving a patient who is ill, already pathological, and then of restoring a damaged organism to health once more.

• One problem for the Hydrobiological Council's research will be scientific assessment of the anchovy resource: determination of its extent, the age of its individuals, the rate of reproduction, the measurement of annual recruitment, and the effect on it of fishery, whether by the bird flocks or bonito schools or man's nets, and the measurement of that effect.

Having this information, the Council can separate the management of the anchovy resource from the realm of controversy between the partisans of birds and fertilizer and fish and food. It should be able to determine the approximate population of anchovies from year to year, the permissible harvest consistent with sustained yield, the tonnage required by existing flocks of guano birds, and that which may safely be utilized by man's fishery with its more valuable products per ton of anchovy and its consequently greater contribution to the economy of Peru.

Man now has no means of measuring bonito abundance, or of detecting changes in that abundance. He cannot now know whether—as some suppose — there are more than one race of otherwise identical bonito which nevertheless frequent the seas along different segments of the coast.

Here is the richest fishery of Peru, and the rich opportunity of studying it scientifically from the virtual beginnings of exploitation. The Hydrobiologic Council will not miss the significance of the moment to its responsibility.

Cooperation with the Inter-American Tropical Tuna Commission in its broader program is a fundamental element in the Council's undertakings.

• But beyond scientific studies of the known fisheries of Peru, that the anchovy, bonito and tuna resources may be used wisely and their yields sustained, there are other fields for fishery research. Today's fisheries are those solely of the surface waters of the Peruvian Current. They work only the surface, and that close to shore. What of the waters of the unkown sea? What of the outer margin of the coastal current, where no vessels fish

Peruvian Research Program And Policy Outlined

• Official statement of the scientific investigation policy and program of the government of Peru is contained in the text of the advertisement sponsored by the Director de Pesqueria y Caza, appearing on Page 38 of this issue.

Technological Laboratory staff at Callao, with Luis Zumaeto S., chief, in the middle. This institution provides extensive services to the Peruvian fisheries, beside exercising quality control over products and imported goods.

today? And what of the bottom? What lives there? And the mid-waters?

To answer these questions the biologist needs the oceanographer — and they both need the practical fisherman to catch the fish they find, as he needs the businessman to pack and finance and sell the catch.

These are stimulating possibilities which the thoughtful Peruvian sees as the eventual extension of the hydrobiological researches launched in 1957.

Fisheries Technology

• First fisheries mission to Peru, requested by that government of the United States in 1941, included a technologist in the investigative team — Norman D. Jarvis of the U.S. Fish and Wildlife Service. This mission had barely rendered its report when the United States and Peru both were thrust into World War II.

With the restoration of peace, further request was made for applied technological assistance and Mr. Jarvis was again assigned to Peru, where he worked from October, 1949, to April, 1950, and again from June 1 to Dec. 7, 1951. His work during this period, as Mr. Jarvis himself outlined it in an address before the Fishery Products Conference of the National Canners Association in January, 1952; "Emphasis was laid especially on improving methods of fish curing and on organizing a system of product inspection and sanitary control of firms packing fishery products. Work on canning was limited to regulatory functions. No research problems or training in canning technology were undertaken."

From this mission came the establishment of the Fisheries Technological Laboratory at Callao. Located on the upper floor of the Callao Fish Pier, the laboratory has as its Chief Luis Zumaeta S., a chemical engineer.

This modern laboratory operates effectively along these lines:

1. Operates a pilot plant for testing new products, such as canned trout and canned mullet, as well as products submitted by the industry. Facilities of the pilot plant include:

   a. A pilot cannery;

   b. Refrigeration division for freezing and storing fish;

   c. Smoke house of advanced type developed by Mr. Jarvis.

2. Inspection of all canned fish imports into Peru.

3. Analysis of fish meal, fish oil, chemically and bacteriologically; and certification of characteristics for export shipments.

4. Sanitary inspection of canneries, reduction plants and freezers; and plant inspection as to facilities and housing provided for personnel.

5. Registration of brands of canned fish sold in Peru, so owners may be protected in promotion of their labels.

6. Control of sanitation in the handling of fresh fish for consumption as such.

7. Patrol of the fleet and inspection of landed catches to determine if the fish have been taken by means of explosives.

8. Registration of all can code marks used in Peru. Can coding is required by law, and this permits the laboratory to trace to the packer and day of production any can of fish packed in Peru.

9. Maintenance of import and export statistics on foreign trade in Peruvian fishery products.

10. Operation of sub-stations at Iquitos, near the border of Brazil on the Amazon, and at Tacna, near the Chilean border, where imports are similarly inspected and statistics gathered.

Quality Inspection

• Private business, through the medium of an independent Food Industries Laboratory, provides highly qualified inspection and certification of Peru's canned fish products.

This agency has Donald F. Roberts as managing director, a sanitarian with long service in the California Department of Health Bureau of Cannery Inspection before going to Peru early in the development of industrial fish canning there.

Operating on a custom basis, this laboratory accepts the responsibility of examining goods on the behalf either of the seller or buyer; evaluating it in general, or with respect to definite specifications; and issuing certificate of quality.

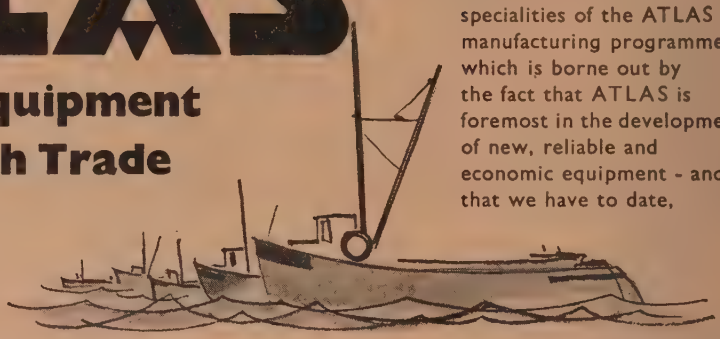
By maintaining high technical standards and complete objectivity, the Food Industries Laboratory has won the acceptance of buyers in the United States, United Kingdom and other European markets.

Where the insistence of British buyers upon certain specifications have established "English pack" for which a premium is paid, the task of the laboratory has come to play a particularly important part. For example, a British buyer wants to know more about a tendered parcel than that it is sound, sweet, full-weight and carries adequate vacuum. He wants to know also that it meets the less tangible specifications of "English pack", the smooth top and bottom surfaces, the firm texture, the uniformity of pinkish color, and the absence of bits or flakes of fish free in the oil, all of which are essential if a parcel is to earn the certification and the premium which go with "English pack".

ATLAS

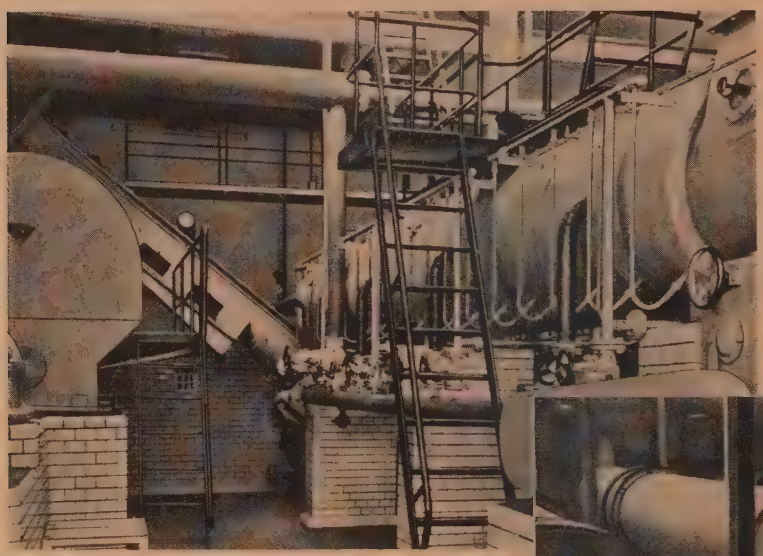
Modern Equipment for the Fish Trade

Fish processing equipment is one of the largest specialities of the ATLAS manufacturing programme - which is borne out by the fact that ATLAS is foremost in the development of new, reliable and economic equipment - and that we have to date,

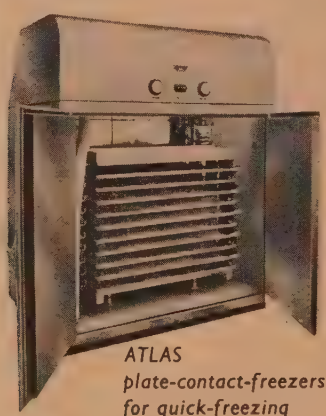


ATLAS-STORD indirect cooker and twin screw press installation

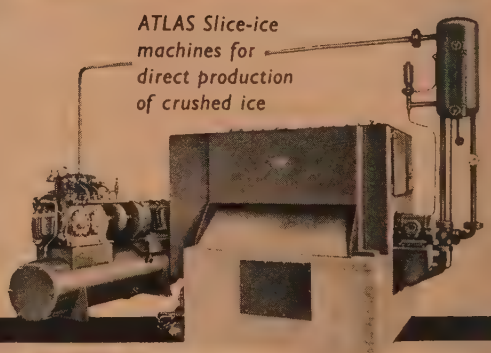
supplied a steadily increasing number of plants to the leading fishing countries throughout the world. Another reason for the preference shown for ATLAS machinery, is that we can supply practically all the equipment a factory will require. If you require a machine or perhaps a complete plant, - it pays to ask ATLAS



ATLAS-STORD continuous rotary steam-tube driers



ATLAS plate-contact-freezers for quick-freezing of fish



ATLAS Slice-ice machines for direct production of crushed ice

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ATLAS has representatives in most countries throughout the world

Whaling Station of Cia. Ballenera del Norte, an affiliate of Archer-Daniels-Midland Co. of Minneapolis, U.S.A., at Tierra Colorado, near Paita in northern Peru. This thoroughly modern plant, equipped with German and British machinery and served by Norwegian-built vessels, went into operation on sperm whales in the summer of 1957.

Chapter XI.

21 Representative Plants,

from Ilo to Caleta Cruz

• Rising from almost nothing to a position of world note in the span of a few years, Peru's industrial fisheries operate in plants which were *adapted* from successful establishments in similar fisheries elsewhere, rather than *evolved* by the process of gradual growth.

In most instances the ability to utilize the experience, methods and mechanical devices proved in other fisheries — adapted always of course to operations on the edge of a tropical coastal desert—has been of advantage and actually made possible the amazing speed which with the fishery was developed. In a few instances it is evident that the necessity for adaptation, or the desirable extent of it, was overlooked; and there are examples where operations are handicapped by the fact that their plants follow too closely set patterns and engineering originated for very different sites and locations and physical surroundings.

• Character of the Peruvian plants is *good*—and some can be rated *excellent*. This is doubtless due in large degree to the fact that they were modelled after successful plants elsewhere, rather than evolved by the gradual process of survival of the fittest. It follows also from the character and quality of the Peruvian businessman, who have undertaken development of their country's fishery resources on a sound, intelligent basis, without compromising on quality in plant, methods or product.

As we have seen in other chapters of this study, Peruvian operations often suffer severe handicap as result of the scarcity of harbors and piers over which fish can be landed. Shipments of canned fish, fish meal and oil either must be concentrated at Callao or Chimbote by trucking or loaded on ocean vessels by means of lighters.

• Canneries are the most numerous and important of Peruvian fishery plants; followed by reduction plants or "fish meal plants", as they are commonly called on that coast; and with freezers trailing.

Some few establishments combine all of these functions in a fully integrated fishery unit: cannery, reduction plant and freezer. These are cases where the refrigeration unit is employed to freeze fish for export as well as to serve the cannery as an auxiliary by refrigerating surplus fish during periods of heavy production for canning when fishing slackens. Thus there are two degrees of integration involving all three plant functions.

Some canneries, on the other hand, have reduction auxiliaries but no refrigeration; and a few have nominal refrigeration facilities without the by-products division.

A few plants, all in the North, function solely as freezers; and there are along the coast substantial numbers of specialized reduction plants, as well as three whaling stations.

All of these plants are represented in various degrees of size and capacity, from large to small, and some to very small.

To provide a specific picture of the industrial fisheries of Peru, representative plants of the several categories will be described in some detail. All plants under such consideration were visited by *Pacific Fisherman* in 1957. They range from north to south over 14° of Latitude and are located at intervals along some 1,400 miles of desert coast.

Classifications discussed will include:

Canneries: large, integrated; medium, specialized; small.

Reduction and Whaling: specialized.
Refrigeration: specialized, including floating plants.

Congratulations on your ***Peruvian Issue*** *from*

COMPANIA PESQUERA de COISHCO S. A.

CPC

producers of

Canned Bonito

Fishmeal

Fishoil

PLANT: **Caleta de Coishco, Chimbote, Peru**
OFFICES: **Edif Rimac #2. Pasaje Acuna 127 Of 605 Lima - Peru**

Cable Address
PESCO - PERU

Star-Kist PERUANA S. A.

Canned Fish

Fishmeal

Fishoil

EXPORTERS AND SALES REPRESENTATIVES FOR

Star-Kist Foods Inc., Terminal Island, California

ADDRESS: **Edif. Rimac #2 Pasaje Acuna 127 Of. 605 Lima — Peru**

Cable Address
KIST PERU

Integrated Canneries

Compania Pesquera de Coishco, S.A.

• Compania Pesquera de Coishco, S.A. is located on an open bay a few miles north of Peru's largest fishing port of Chimbote, from which it is reached by a rock-cut road. The company is headed by Dr. Manuel Almenara, and maintains Lima offices at Nicolas de Pierola 611 en suite with Star-Kist Peruana S.A., which has a substantial interest in the Coishco company and conducts its operations.

Those at Coishco are under the general management of Paul Gligo; while his brother, George Gligo, is director of all other Star-Kist activities in Peru, with headquarters in Lima.

Although the Coishco cannery location is an open bay, high headlands give it much protection from the south, while a screen of guano islands not far offshore serves further to moderate the prevailing seas. In addition to the plant and its operational facilities, there is a considerable company village of quarters for plant employes and fishermen. However, the great majority of the workers live either in Chimbote or Santa. The company finds it necessary to operate two transportation lines, one to each of these towns. Employes are brought to the plant in the morning, returned to their homes at noon, picked up again after the two-hour rest period, and returned at night. This transportation of employes is a major operating problem at Coishco, adding 20% to the labor cost, and offsetting to a considerable degree the advantage of having sufficient protection to make possible one of the few adequate cannery piers in Peru.

Coishco, as the entire operation is familiarly known in Peru, was built in 1948 primarily as a "packaged" unit designed, furnished and equipped by Standard Steel Corporation, Los Angeles. Buildings are built of brick, faced with cement stucco and roofed with corrugated "Transite", asbestos cement panels.

Pier facilities at Coishco are unusual for Peru, and serve satisfactorily the substantial fleet of seiners which supplies the plant with bonito, anchovies and tuna for freezing and export when it is available. Boats in this fleet run in size up to the *Monterey Fisher*, a 77-footer built in Seattle in 1947 by John Breskovich and originally christened *Robert B.*

Bonito, tuna and anchovies are all unloaded at the pier, the larger fish by boom tackle which discharges them into trailers with shallow dump bodies. These run on rails and are drawn by small gasoline tractors. Fish are released either into thaw tanks or to the boot of a conveyor which takes them directly into the cannery.

Anchovies are unloaded from the seiners by two Kimmerle fish pumps,

George Gligo, manager of Star-Kist Peruana S.A. operations, with headquarters in Lima.

from which the fish are piped overhead across the pier roadway and into the plant in a flume which discharges to a de-watering screen and automatic scale above the pit from which they are drawn by conveyor to the reduction equipment.

It is noteworthy that all fish delivered to Coishco receive an absolute minimum of handling for the Peruvian fisheries.

Cannery equipment except for the closing machines, came in large degree from Standard Steel Corporation. Basically, the plant consists of five typical tuna cookers and five packing lines, although the plant actually has seven closing machines on stream, to which cans can be diverted from the filling lines. Normal closing machine set-up includes two lines of halves for solid pack; one line for solid quarters; a line for chunks and flakes; and one for 4-lb. talls. In addition, a 1-lb. tall machine can be brought into operation.

Of the seven can-closing machines in the plant, four are Angelus seamers, two are Continental Can Co., and one is American Can Co. Cans are processed in four Standard Steel retorts, with Taylor recording thermometers controlling the cook.

The reduction plant is equipped with two Standard Steel cooker-press-drier units of 8 and 5 tons hourly capacity. A DeLaval ACVO centrifuge recovers the oil from the stickwater, with oil finishing by the settling tank method.

The refrigeration division has a dual function: (1) freezing and storing tuna for export in the round; (2) chilling and/or freezing bonito during periods of heavy landing to supply the cannery when fishing is slack. Frozen fish capacity approximates 2,000 tons, with daily freezing in three York tunnels ranging from 50 to 60 tons per day, depending upon the size of the individual fish.

Bonito and tuna to be frozen are placed on special pallets which hold the layers of fish apart and permit air passage. As a stack of pallets is filled to proper height, it is picked up by a Baker electric lift truck, of which the plant has five, and carried into the freezing tunnel.

Refrigeration is provided by four Baker compressors, three Yorks, and three York boosters. Electric power for the plant comes from Chimbote, but irregularity of service makes it necessary to provide stand-by in the form of three General Motors, one Caterpillar and one Cummins diesel, which combine to provide 240 kw. This is not sufficient for full canning operation, but will provide plant lighting, while operating the cold storage or one of the other main divisions of the establishment.

Water comes from a well on the hill above the plant. It is adequate in volume, but extremely hard, requiring thorough treatment before use in boilers.

Fish meal storage is all in the open in the desert climate where rainfall is virtually unknown.

In addition to the usual functions of a fish-packing concern, Compania Pesquera de Coishco operates a school at the plant, providing at its own expense elementary education for 60 children of employes.

Compania Maritima Pesquera, S.A.

• *Gildemeister* interests represent the highest levels of Peruvian industrial and financial activity. Primarily in sugar, the Gildemeister family following World War II entered the newly-rising fisheries as a means of diversification. A secondary purpose is to provide continuity of employment in the canneries and reduction plants during periods when work on the sugar haciendas is slack.

Fishing activities of the Gildemeis-

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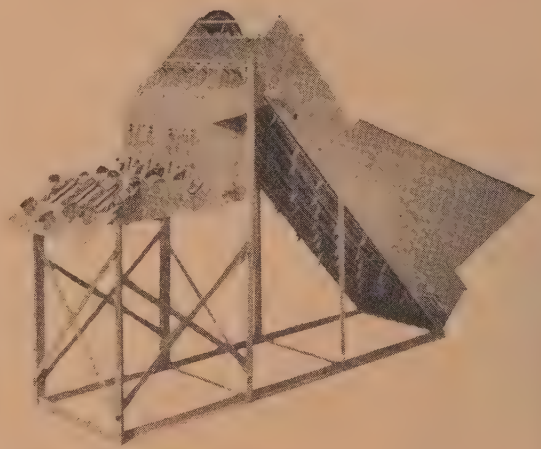

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ter family are consolidated in Compania Maritima Pesquera S.A., which has a large integrated cannery-reduction plant-whaling station at Chancay, plus reduction plants at Chimbote, Casma and Huarmey. These latter will be discussed with specialized reduction plants. Here we are concerned solely with Chancay, the Gildemeister cannery-reduction-whaling establishment.

This integrated plant, which is said to have cost U.S. $2,000,000, is situated in the lee of a headland about 40 miles north of Callao at the desert edge of one of the irrigated valleys which was the original reason for the existence of Chancay. General manager of the Gildemeister fishery interests is Eberhard Mayser, with headquarters at Azangaro 235, Lima. At Chancay with Eduardo Cabada is administrado and Enrique Guevera is production foreman.

The canning division at Chancay consists of two lines for halves and one for quarters. After the fish are cooked and cooled the loins are prepared by women who place them on trays where they are inspected before going to the filling lines. All cans are filled by hand, and by a procedure which has become standard in many Peruvian canneries. The filler places several sections of loin in the can until it is nearly full. The chine of the can is then rapped sharply on one side of the work surface, which serves to settle the fish laterally toward that side, usually leaving room for one more loin section to fill the can to capacity.

The surface is then firmed and smoothed, and adequate headspace insured, by pressing down on the surface of the fish with a metal hand tool whose circular face is just smaller than can diameter. The filled cans receive oil at 180° and are then given a short exhaust to establish vacuum upon cooling from the process cook.

The cannery is served on an auxiliary basis by a refrigeration division with capacity for holding 150 tons of fish. Compressors are Worthington. Main power for the plant is provided by twin 450-hp. Enterprise diesel engines.

Reduction division is equipped with two distinct units. One of these with capacity for 170 tons of fish in 24 hours wash manufactured by Schlotterhose & Co. in Bremerhaven, Western Germany. From the cooker-press unit the press cake passes to a steam-jacketed drier.

The second unit is a Standard Steel Corporation plant with cooker and press followed by a steam drier, which differs from the German equipment in that it is a steam tube type instead of being steam jacketed.

Chancay Operations—Upper view shows reduction department, with meal stored in the open on the ground. Fish arrive by pipeline from fish pumps on the pier in the background, are drained and weighed at the left and then pass into the pit just left of center, from which they enter the reduction plant. **Lower** gives an idea of the modern structures comprising the Chancay installation.

The whaling division, which is equipped with Schlotterhose reduction and press machinery and cookers, delivers its oil to a single oil-purifying section which it shares with the anchovy reduction plant. There is a battery of centrifuges in this section, including one Sharples, several De-Laval, and two Westphalia machines, the latter being of German manufacture.

Gildemeister fishery operations are standardized to a considerable degree in the interest of efficient maintenance and inter-changabality. A prime instance of this is in the motive power of the fishing vessels serving the several plants of Maritima Pesquera. These craft are all equipped with Caterpillar Diesels, most of them either the D318 or D326 models, with a few of the smaller boats having the D314 packing plant.

The plant machine shop is equipped to do anything which may be necessary in maintaining Caterpillar diesels of these types in effective operation. The feeling is that better work can be done more quickly with a shop equipped to serve one make of engine.

Netting is also standardized to a large degree. Most nets are of DuPont nylon, fabricated into "Blue Nose" brand nets by Dominion Textile Co., Ltd., of Canada. Net floats are Spongex and heavy cordage is of Philippine manufacture.

Chancay has the advantage of an adequate pier and perhaps the most adequate haul-out ways for vessel maintenance seen at any Peruvian packing plant.

Corporacion Financiera y Comercial Amial Peruana, S.A.

• Samanco, location of this company, often known as "Amial" in the Peruvian fisheries vernacular, is at the head of a narrow, well-protected bay a few miles south of Chimbote. At one time it was a port of some consequence, with a custom house and ocean shipping business. The water

Samanco Standards are exceptionally high as indicated by the pictures in this panel. At the top a general view of the cannery interior during an inactive period. Note the light, cleanly, well-equipped and modern plant. When the packing crew runs out of fish the girls may be put to work making nets, as in the middle picture. At the bottom is a general view of the processing department, showing the five modern retorts.

was shallow, however, and occasional freshets on the stream which reaches the sea at this point brought shoaling which ruined Samaco as a port for ocean vessels, although it remains entirely adequate for fishing vessels, and offers perhaps the best-protected but rather limited harbor on the coast.

The company with its impressive name was of French origin, and is under general direction of S. Kroupnitzky, with headquarters offices at Calle Correo 169, Lima. Plant manager at Samanco is J. Alberto Valle.

Amial is a fully-integrated operation, although its cannery auxiliary refrigeration division is of minor character. On the other hand, this is the first plant in the Peruvian industry to manufacture condensed fish solubles from its stick water. Further, it makes a specialty of canning quarter oil sardines, using the Peruvian anchovies, which give an exceedingly attractive pack.

With its protected, though shallow, bay the Samanco cannery is equipped with a fish pier ranking with the more adequate in the Peruvian fishery. The pier has a concrete deck and a roadway of width to permit trucking of bonito, although anchovies are carried into the plant by means of a concrete flume, which is one of the distinctive features of the plant.

The pierhead is equipped with a mobile fish pump which can be shifted from one boat moorage to another. The equipment is of Amial's own manufacture and delivers the anchovies to the overhead flume mentioned as particularly notable. This trough is composed of pre-cast concrete sections, supported on pre-cast concrete posts. It serves admirably and delivers the fish without leakage.

This concrete flume is an example of the extensive employment of concrete about Peruvian fisheries plants. In that country steel is scarce and expensive, while cement is relatively cheap, and certainly sand and gravel is common enough. Thus it should not be surprising to find frequent use of concrete for fuel oil, fish oil and water storage tanks, as well as many other plant structures. Sparse use of light reinforcing steel is compensated by heavy sections.

The Samanco bonito cannery differs from others seen in Peru in that it has provision for forced-air cooling of pre-cooked fish where weather conditions or pressure of production may require. Normally the bonito from the plant's eight pre-cookers is accomplished in the normal manner by placing the rack in shaded areas with the sea wind blowing through. However, where production presses or temperatures are high and air movement scant, the racks of cooked bonito are pushed through a long tunnel, counter to a current of air induced by large fans.

Can-closing machines for bonito are of Angelus manufacture, two half-pound lines and a *vacuum* line for talls, one of the few—if not the only—vacuum closing lines in the Peruvian canneries. In addition to the three lines for round cans, there is an oval line for packing machete or "herring" in tomato sauce; and a quarter-oil line with a semi-automatic Max Ams seamer which is surely an antique, but which continues to roll its seams true and tight, albeit not very fast.

Amial has five retorts, all equipped with Taylor recording thermometers. Three of them were Seattle-built by Acme Boiler & Tank Co. The others are Peruvian products of similar design.

The cannery power plant is particularly interesting because the six diesel units can be operated in any combination to provide for the needs of any elements of the plant without waste. There are one Caterpillar D8800; two Caterpillar D-3118s; one Caterpillar D342; one Caterpillar D1300; and one International.

Samanco's notable reduction division consists of two complete cooker-press-dryer systems, one from Standard Steel of Los Angeles and the other Danish Atlas-Stord manufacture. Combined capacity is in the neighborhood of 15 tons per hour. The two systems can operate independently or jointly, as most of the units are interconnected.

The Atlas equipment includes a steam-jacketed steam cooker, double-

screw press, vibrator-strainer and steam-tube dryer.

Press liquor from all equipment goes through a pair of De Laval centrifugal roughers, followed by settling tanks and decantation for refining.

All stickwater is evaporated in an Atlas two-stage concentrator, already mentioned as the first to be installed in Peru. The concentrated solubles are not sold as such, but are combined with the presscake and dried in the normal manner, giving a substantial increase in meal volume and the added advantages of "whole-meal" composition. The process is a rather difficult one, particularly under tropical conditions.

In canning quarter-oil sardines, Amial uses selected fresh-caught anchovies, carefully graded for size, headed and gutted by hand, and flaked out on screens for a steam pre-cooking which expells oil and moisture. The cooked fish, which compare with the tiniest Norwegian brisling in size, are then allowed to cool and dry in a current of air, which firms them further. They are then carefully placed in the quarter cans by hand, the cans being filled with boiling oil just as they pass into the double seamer. This establishes adequate vacuum in the processed tins.

Empresa Pesquera Ilo, S.A.

• This is the oldest of the industrial fishery operations of Peru, also the largest, and perhaps the most fully integrated.

It is located at the port of Ilo, southernmost on the coast of Peru, and about 50 miles above the border with Chile. There is a saying that "When you are in Ilo the sun is your nearest neighbor". This has been true from the beginning of time, but can hardly be called true today.

The sun is still there of course, and very close, blazing into your face from the sands and the sea, burning into the back of your neck; but the Southern Peru Copper Corporation, with $200,000,000 to spend, has come to share Ilo with Episa, the guano birds on the cape, and the olive planters in the valley of the River Moquegua, which here enters the sea when the crops have not drained its last drop.

So today Episa has a giant neighbor, who is at Ilo to stay. The two get along well, however, and Ilo is closer to the rest of Peru through the seaport and airport facilities, the road and railroad, the town and smelter which the enormous copper enterprise has brought.

• Ilo was one of the four original fishery developments recommended by Carl Hedreen as result of his investigations for the Wilbur-Ellis Company at the close of World War II, and it was the first to be built—by Mr. Hedreen in 1946, although of course it has been much expanded since. Participating in the development at Ilo was James R. Townsend, today a San Francisco fisheries consultant and technologist, who had previously been associated with Mr. Hedreen in Canada and had joined the Wilbur-Ellis Co. technical staff. He served also as consultant for Industria Pesquera at Callao, and since has conducted a consulting service in fishery technology in many of the world's leading fishery regions.

J. Alberto Valle, resident manager of Corporacio Financiera y Comercial Amial Peruana S.A. at Samanco.

President of Empresa Pesquera Ilo S.A. is Manuel Elguera, who maintains company headquarters with those of the other enterprises in which he is interested at Avenue Tacna 592, Lima. Manager at Ilo is Cameron Draney, formerly a cannery superintendent in Canada with British Columbia Packers, Ltd. His assistant is Cecil Howden, also trained in British Columbia in the canneries of The Canadian Fishing Co.

The Episa operation is fully integrated, with a bonito cannery, anchovy and offal reduction plant, and a freezing division which serves a dual purpose: frozen fish reserve for the cannery; and tuna freezing for export in that form. This latter aspect is secondary to the cannery-auxiliary function in that tuna availability at Ilo is irregular, with some seasons when virtually none are taken.

The considerable fleet of seiners serving the plant with both bonito and anchovy is company-owned. There are approximately 1,200 employes, counting those on the fishing vessels, and a substantial proportion of the total are provided with company housing. Fuel is drawn from the Ilo tank farm of International Petroleum Company near the cannery. Water supply is provided by wells sunk in the bed of the Moquegua River, but there is chronic scarcity and the water is very hard, requiring treatment for boiler use.

Salt for canning comes from a rock salt mine a few miles from the cannery, where it arrives in large lumps of solid crystal. Purity is unusually high and Ilo salt is regarded as equal to the best for food use.

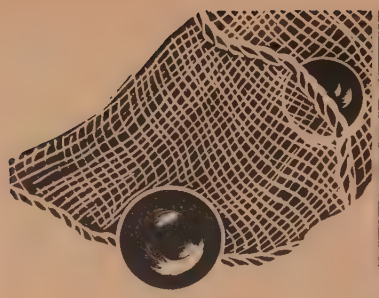
Ilo is on an open roadstead, partially protected from the south by a cape, but with a constant surge falling on the beach even in the calmest weather. Episa has a stub pier, but it is not adequate for unloading fish. There is also a public pier, where small vessels could lie in quiet weather, but it is rarely available for fishing craft. The copper corporation is building a 600' concrete pier for ocean vessels at a cost of about $6,000,000, but it will serve the fishery only to the extent that it may provide some minor measure of protection from surge.

Faced with a serious problem in the matter of handling the discharge of fish from its vessels, Episa developed a system which serves to overcome the almost impossible task of landing large tonnage through the surf on an exposed and rocky shore. Even so, the fish-discharging operation is a difficult and even dangerous one. Equipment and method are:

A structural steel latticed boom projecting at angle over the water from a rocky point. On another point perhaps 300' away is erected a steel tower, on the side of which is a hopper, from which a gate permits gravity discharge of fish. Trucks back down a rocky roadway and are spotted below the hopper discharge.

A fixed steel cable runs from the point of the boom to the tower, both of which are of course well stayed. On this fixed cable runs a carriage block somewhat similar to that employed in slack-line logging. This block carries a hoisting cable and a haul-back line which permits it to be spotted at any point on the sky-line.

When bonito are being unloaded the fishing vessel is moored off the beach outside the breaker, but as close to the cableway as safety will permit. Fish are unloaded from the vessel into a rope brail carried by a large flat-bottomed skiff. The heavy steel ring of the brail rests on the skiff's gunwales and the basket can be filled to the depth of the skiff. The skiff is then skulled to a position beneath the sky-line. The hoistman lowers the hook of the carriage hoisting line. This is engaged in the bridle of the brail



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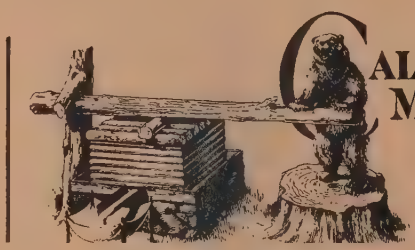

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Lima, Peru

Cable Address:
Bancherossi — Lima

Luis Banchero Rossi
General Manager

and the load of fish is lifted from the skiff, carried along the cableway and discharged into the hopper at the tower. The empty basket is returned to the skiff, which at once makes place for the next loaded skiff.

The fish are drawn from the tower hopper into trucks and hauled to the cannery, perhaps a third of a mile away.

• Where anchovies are handled the unloading system varies slightly. The fishing boats moor side-by-side parallel to the sky-line and bow-on to the rocky shore. Anchovies are brailed and shovelled into the skiffs themselves, which are spotted beneath the wire. There the fish are shovelled into oil drums open at one end and fitted with rope bridles. The carriage block hoists three of these at a time to the tower hopper, from which the fish are trucked to the reduction plant.

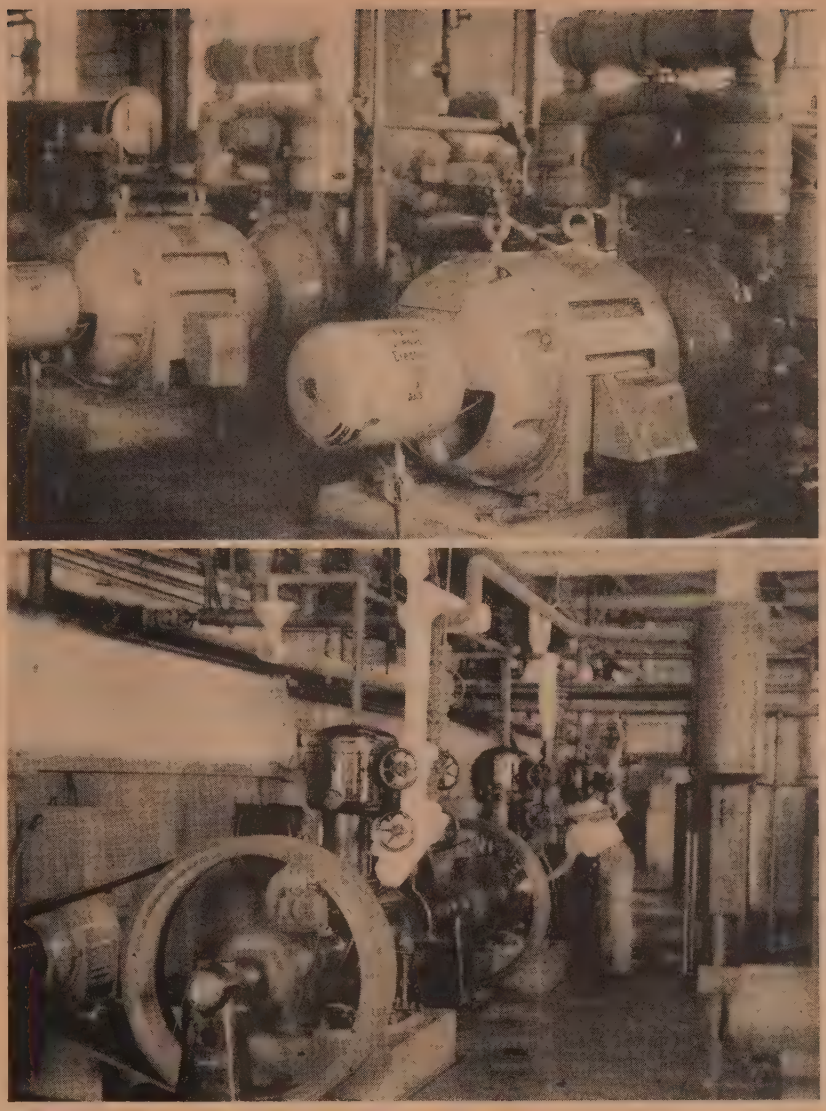
This laborious system of handling anchovies is expected to be replaced shortly, for when the plant was visited it hand on hand the equipment necessary for a "Monterey type" fish pump in which the boats brail their fish into a floating hopper offshore, from which they are pumped through an underwater pipeline into the plant.

• Can supply for Episa represents a difficult problem, solved by unusual means. Tins are drawn from two sources, the factory in Callao, from which they must be brought by truck a distance of approximately 750 miles; and the factories of the American Can Co. at Seattle and Portland.

Cans from the United States are delivered at Ilo in collapsed form, as they are shipped to Alaska. They are brought by inter-continental ocean freighters of the Grace Line and lightered ashore at Ilo. The Episa can loft is equipped with a Canco reforming line where the collapsed cans are reformed, flanged, bottomed and tested. The system originally conceived for Bristol Bay serves as well in the Humboldt Current. Cans are handled and distributed throughout the cannery by Albertali equipment.

There are four canning lines at Episa, two automatic lines for halves and one for quarters, with a semi-automatic 4-pound line. When the plant was visited a 1-lb. tall machine had been substituted for one of the half-lines, and was putting up brine-pack bonito with short loin sections packed two-deep in the cans.

Although the cannery is equipped with an experimental machine filler, all filling of commercial character is by hand. Vacuum is assured by a short exhaust, followed by hot oil; and all cans are carefully loaded in cooking baskets, two layers in the case of halves, and are processed flat. This departure from normal tuna canning practice has eliminated scorch and reduced loose bits of fish in the oil.



Power and Refrigeration for Ilo is produced on this equipment. Caterpillar D375 diesels driving 185 kw. generators are the source of Episa power. Lower photo shows the battery of five Frick compressors which handle the refrigeration load in the Ilo freezer and storage.

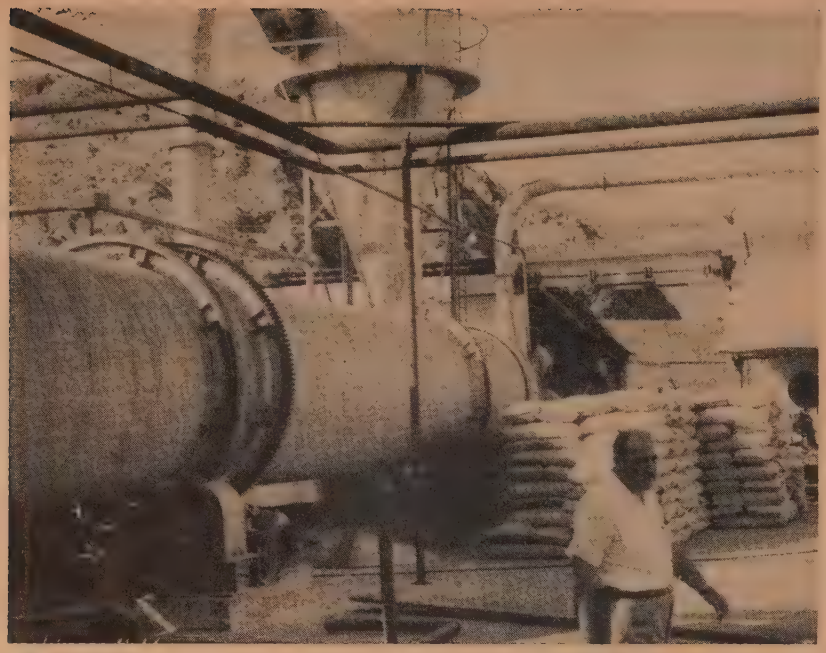
• Episa's refrigeration plant depends on five Frick compressors, three 8 by 8 duplexes, one 5 by 5 and one 4 by 4. The plant has three sharp rooms for freezing fish, and an ice tank. Frozen fish storage capacity approximates 2,000 tons, plus 250 tons of ice. Fish held in frozen storage for more than a few days are glazed in the storage room.

The Episa reduction plant has three cooker-and-press units, all served by a very large direct heat dryer. Largest of the presses is a P & L unit with 10 tons hourly capacity. The other two presses are of screw type, both California Press Manufacturing Co. machines, with hourly capacity of 4 tons and 5 tons, respectively.

Power for Episa is provided by two Caterpillar D375 diesels, each driving a 185-kw. generator; a smaller Caterpillar driving a 35-kw. generator; and a General Motors parallel twin diesel generating 100 kw.

• Operation at Ilo is complicated by the extreme remoteness of the location and the long distance from any maintenance facilities. This puts a heavy "make-do" demand on plant management and personnel. Just as much as possible of the plant and fleet maintenance must be done at Ilo.

The Episa inventory of supplies and equipment stands at $350,000. Its machine shop makes such items as loin guillotines, cleaning and packing tables, tuna cooking racks, helical conveyors for the reduction plant. There



Big Standard Steel fish meal drier in the "Amial" reduction plant at Samanco, Peru, one of the foremost canneries and reduction plants in that country. In the foreground, J. Alberto Valle, resident manager. Note the meal in paper bags, an innovation in the Peruvian industry in which Samanco was a pioneer.

is actually a small foundry capable of casting wheels, pump impellers, and propellers for fishing vessels.

Further, they have a galvanizing shop which does spray galvanizing and metalizing; and an electrical shop which rewinds motors, repairs radios, and handles all plant electrical work.

Episa has a boat shop and haul-out facilities capable of handling the fishing boats in a rocky cove some distance from the plant.

The company fleet consists of 32 fishing vessels, now all converted to diesel power. The larger craft are uniformly equipped with Caterpillar diesels, while a number of the smaller boats carry German-made Duetz air-cooled diesels, which have proven quite satisfactory even under the tropical conditions in which they must operate.

In addition to the 30 fishing vessels ranging up to about 40′ length, Episa is served by two larger vessels, the *Cavalieri*, built in California in 1935, an 88-footer; and the *Sun Star*, 77′. The latter vessels fishes bonito, working with a Puretic power block, which is proving highly successful.

The *Cavalieri*, on the other hand, acts as a refrigerated station ship for the eight seiners of the larger class, which are capable of remaining at sea for a number of days. These vessels are roughtly of the "Alaska limit" size and type, 50 to 57′ overall. The major portion of the fleet, 22 vessels in all, are of smaller size, fishing bonito and anchovies on a day trip basis.

• Step-up of employment at Ilo as result of the Southern Peru Copper Corporation activities has produced a large increase in population with inevitable sanitary problems. To cope with this condition Empresa Pesquera Ilo S.A. and the copper company's contractors entered into a joint undertaking by which they share equally in the cost of "fogging" the entire town several times a week with a malathion-based insecticide. This is applied by power atomizing equipment carried in a truck, which thoroughly covers the entire town, individual dwellings as well as plants and streets.

• Episa is the oldest of the modern fishery plants in Peru. It is generally accepted as the largest producer. Moreover, it continues to grow and improve.

Mention has been made of the installation of a "Monterey type" fish pump with anchovies pumped from a floating hopper through a submerged pipeline.

Another project calls for moving the reduction equipment entirely into a building originally constructed as a fish meal warehouse. This will provide more room in the main buildings and will entirely separate the primary departments: cannery, refrigeration and reduction.

There is a longer-term plan for the possible construction of a breakwater which would permit the bonito boats to lie alongside the extended pier for discharge, and which would also facilitate lighterage of finished goods for ocean shipment.

These are things to come at Ilo.

Canneries, Specialized

Empresa Pesquera Peru, S.A.

• Empresa Pesquera Peru S.A. is an operating company headed by Carl Hedreen. It maintains headquarters at Carabaya 831, Of. 313, Lima, and for several years operated the cannery at Supe under lease, in 1957 exercising its option to purchase. British Columbia Packers, Ltd.,. announced in October, 1957, that it had acquired a substantial position in Empresa Pesquera Peru S.A.

The cannery, which is called "Supe" in the industry, is located in the coastal town of that name perhaps 120 miles north of Lima. It was built by Sociedad Union Pesca Envase S.A. — note that the initials of the name also spell SUPE, an achievement for which Peruvian businessmen sometimes strain in naming their companies.

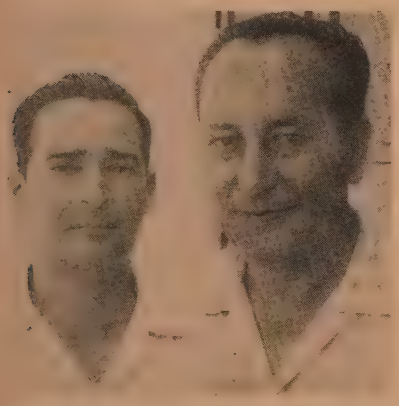
The plant is located away from the waterfront at Supe, which is one of the few ports where there is a pier at which vessels can discharge their fish. Most of its bonito are derived either from the local fleet of Supe gillnetters —for this port shares with Callao the distinction of being the principal Peruvian centers for fishing this gear—or are trucked from Huarmey and Chimbote, to the north.

Supe stands alone among Peruvian packing plants in that it is the first to be equipped with facilities for chilling fish in refrigerated sea water, and thus keeping them in prime condition for canning. This equipment, which was in the process of installation when *Pacific Fisherman* visited the plant, consists of a series of concrete tanks, filled with chilled seawater, into which the bonito not needed immediately for canning can be held just above the freezing point until they can be accommodated.

Refrigeration of the heat-exchanger in which the sea water temperature is pulled down is provided by a new Baker ice machine driven by a P. & H. diesel. Although the plant normally

Carl Hedreen's cannery at Supe is the first in Peru to be equipped for holding fish in refrigerated brine until they can be canned. Note the cannery chapel behind the knot of men.

draws its power from the community system, this service is so subject to interruption that it has been necessary to provide auxiliary electric generation with a Caterpillar and an International diesel as stand-by power. The refrigeration compressor, on the other hand, is direct drive from the P. & H.



Figuerola cannery at Chimbote is typical of the medium-sized Peruvian canneries. Victor Cardenas, R., left, is administrator. With him is Carlo Bonhenas, technologist.

Particular attention has been given to lighting at Supe, with modern fluorescent lighting throughout the fish preparation and packing departments. The concrete floor also is smooth, smartly sloped for drainage and easy sanitation. There are three lines, for halves, quarters and 1-lb. talls; two of them furnished with Angelus closing machines and the third with an American Can Co. seamer.

Supe has a reduction plant adjoining the cannery proper, which hitherto has been a relatively small part of the operation, drawing its raw material largely from cannery offal.

An interesting aspect of the Supe cannery is the small Catholic chapel built into the front of the cannery for its employes.

Alfonso Figuerola Anara e Hijos, S.A.

• Chimbote, principal fishing port of Peru, is the location of the Figuerola plant, which ranks among the larger canneries of the many on this bay, although in a general classification it would be of medium capacity—about 1,000 cases of halves daily production.

The cannery building is ample, and admirably equipped. It is designed for straight-line operation but while located with the intake end of the plant on the Bay of Chimbote, has no dock facilities. Fish is trucked to the plant a short way from the Chimbote pier.

There are six small pre-cookers for bonito, and two fish preparation tables supply the single filling line. All working surfaces on these lines are thick white marble slabs, somewhat similar to those frequently used by candy makers, but fairly common in Peru for cannery preparation and filling tables. The hand tools used to press and smooth the loins in the cans are of cast aluminum faced with stainless steel discs.

The four retorts which take the cans from the Angelus closing machines are equipped with Foxboro recording thermometers. Refrigeration supplied by a 7½ by 7½ Worthington compressor chills a room where fish can be protected prior to canning, but the plant is not equipped for freezing fish.

The reduction department is an open air installation adjoining the plant. While it was being substantially increased in capacity in 1957, primarily by adding an improved Peru-made dryer to the Standard Steel Corporation cooker and press, reduction is a relatively minor element in the Figuerola operations.

The cannery on occasion packs machete in tomato sauce in 1-lb. oval tins — "Portolas" — for the domestic trade, but this is not an important aspect of its production.

Conservas Miramar, S.A.

• Conservas Miramar, one of the Manuel Elguera enterprises, is an excellent example of medium-size, specialized cannery. Its concern is wholly with canning bonito.

True, this Chimbote operation formerly was equipped with a small reduction plant, but this was removed at the end of the 1956-7 packing season and installed in a related plant. This gave additional warehouse space for canned goods and permits more efficient cannery operation.

Miramar is among the older Peruvian bonito canneries and has built up a reputation for its product on the basis of painstaking packing and close attention to the "English pack" specifications.

The plant is situated on a city street in Chimbote, well away from the waterfront. All working surfaces are marble slabs. Bonito is packed in halves, quarters and tall cans with Angelus and American Can closing machines. Sealed cans are washed on the effective German Lubeckewerke machines which have gained wide acceptance throughout the Peruvian canning industry.

Miramar has refrigeration sufficient for protecting the quality of bonito deliveries until the fish can be handled in the cannery. Freezing or extended storage is not provided.

Conservas y Salazones, S.A.

• Although its name indicates that curing is a function of Conservas y Salazones S.A., this operation at Huacho, perhaps 50 miles north of Callao, is devoted wholly to canning, with the manufacture of fish meal as a sideline.

The company has as managing director Carlos Otero Lora and maintains headquarters offices at Lima, Calle San Jose 312 altos. The cannery

"Consa" at Huacho is typical of the moderate-sized modern canneries on the Peruvian coast. Upper portion of the open-air reduction plant is seen just to the left of the stack.

itself is a commodious structure of concrete and brick construction. Company policy calls for the exercise of strict quality control and the technical and chemical laboratory at the plant compared with the best observed in Peru. In addition to checking weights, seams, fill, vacuum, salting, color, texture, and other characteristics of the canned pack, the laboratory analyzes the plant's fish meal for oil and moisture content.

Consa, as Conservas y Salazones S.A. is known in the canneryman's vernacular in Peru, departs for established practice in a few interesting minor particulars of the canning process. For example, the cannery makes a practice of removing the heads in butchering the bonito, counting the pre-cooking capacity gained as offsetting any minor loss of fish.

Another departure is in salting the cans, this being done in the empty can before it is filled with fish. Compacting of the loins within the can to give the firm pack and smooth surface sought is accomplished by means of a lever-actuated plunger, giving greater pressure than the usual hand tool. All seamers in the plant are of Angelus manufacture.

The Consa reduction plant is an open-air installation, modernly equipped with an Enterprise cooker-press-dryer unit, with a Titan centrifuge employed to recover oil from the press liquor.

Canneries, Small Type

• There are numerous small canneries in the Peruvian fisheries — some of them very small indeed.

While many of the very small plants have encountered difficulties, these appear to trace primarily to the lack of financial strength which in itself probably was responsible for the restricted character of the operation in the first place.

Limited size has not limited success in a number of instances, and some of the smaller canneries have earned excellent reputations for the quality of their packs. This appears particularly to be true where the plants are located close to the delivery point, as they rarely are refrigerated.

Nor are the small plants concerned with fish reduction. The offal produced is usually sold to fish meal plants in that form. The small plants regulate their fish purchases carefully to the capacity of the plants in order to avoid carrying fish from one operating cycle to the next.

Cia. Pesquera La Florida, S.A.

• Luis Branchero is the managing director of this corporation, making headquarters in the Edificio International, Lima.

Although relatively small in physical structure, "Florida" actually has productive capacity comparable with some of the plants of medium category, being capable of producing as much as 1,000 cases of halves a day.

It is virtually an open-air cannery, but admirably located in such a way as to take advantage of the cooling effect of the steady trade wind. The plant is oriented so the prevailing winds blow through it strongly. There are four cookers and as many retorts, equipped with Taylor recording instruments. Seamers are American Can, Angelus and Continental Can, followed by Lubecawerke can washers.

The plant had just installed a new boiler when visited. Power is provided by diesel engines, two Internationals and one Cummins.

Cia. Pesquera Bebsa, S.A.

• Honorio Farro, a graduate of the Universtiy of Washington School of Fisheries at Seattle, is the principal owner of this operation, which has come along rapidly under his direction, showing a strong growth trend.

In common with a number of the small canneries in Peru, operations are conducted within a structure composed of a high surrounding wall, with the fish preparation and packing activities protected overhead by a covering of "estera", heavy matting woven of split reeds. This primarily provides protection from the sun in a country where it never rains, and at the same time allows for good ventilation and the sweep of the wind.

Although it might be supposed that sanitation would suffer in such a structure under tropical conditions, close scrutiny at Bebsa and elsewhere

Miguel Mattos, administrator of the Gildemeister reduction plant at Casma, a model of its kind and reduction plant "housekeeping".

showed that this is not necessarily the case, and that system and scruples and thorough cleaning can produce acceptable sanitary conditions under an "estera" roof. Bebsa when visited was clean and sweet, free from dust and flies.

Bebsa operates on what might be called a "batch" basis, with the women preparing a batch of pre-cooked loins, and then the same crew shifting into the packing function until these have been gotten into the cans, when they return again to preparation work.

Can closing and can washing machinery in this plant was all of Lubecawerke German manufacturer when it was visited, but a new Angelus seamer was on order from Los Angeles.

Alfredo Peraun is superintendent at Bebsa, with Manual Tavera as his assistant.

Felipe Ganoza, S.A.

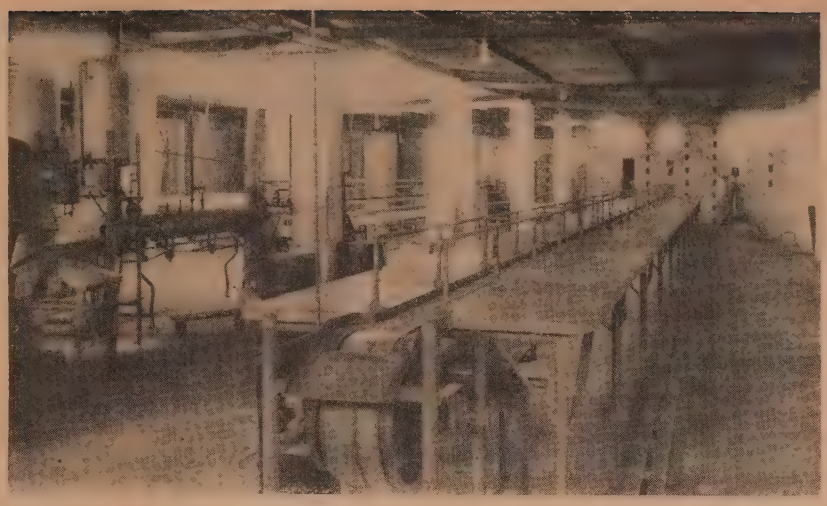
• Senor Ganoza has a small cannery with boiler, cooker and retorts entirely in the open air; and with the

BEBSA Staff—Manuel Tavera, assistant superintendent, left, with Alfredo Peraun, superintendent.

packing divisions enclosed only by a wall topped with a roof of estera matting, but it has built a reputation for a first-class pack, carefully and conscientiously produced.

Particularly notable about the Ganoza cannery is the remarkable degree to which the equipment was homemade, most of it by the plant crew in the plant itself. The retorts, for example, are sections of iron pipe with flanges welded on and doors locking with big bolts and nuts. The guillotine knife for cutting loins to can height derives its reciprocating motion from a Ford Model T crankshaft.

The plant is small, but it is clever, and it is clean. It has a reputation for its pack and Felipe Ganoza and Antonio Perez, his superintendent, are proud of it.



Felipe Ganoza cannery at Chimbote is typical of the small, specialized Peruvian canneries. Note the ceiling of estera matting. Much of the equipment in this plant was made in its own shop by its own specialists.

Reduction Operations

• Of approximately three dozen reduction plants in Peru at the end of the 1956-57 operations season, about half were specialized operations devoted wholly to the manufacture of fish meal and oil—but meal primarily. The other half were reduction plants operated in conjunction with canneries.

The number of plants in active operation will increase somewhat by the end of 1957 as result of the installations completed during the closing months of 1957.

Fish reduction plants in Peru would rank on an exceptionally high level in competition with establishments in this business throughout the world. This is particularly true with respect to the character and quality of the equipment and installation. If capacity is taken as the criterion, the Peruvian plants are somewhat less notable. Many are small; and few are large; but most are well equipped. Machinery for many came from sardine plants in California, or San Francisco or Monterey Bays, left high and dry when the tide of sardine abundance ebbed. Much of the brand-new equipment is of European manufacture, and designed to produce the kind of fish meal Europe particularly wants. As that is the leading market for Peruvian meal, machinery of European manufacture has found place in Peruvian reduction plants.

Cia. Maritima Pesquera, S.A.

• Most notable single concern engaged in the Peruvian fish reduction business is Maritima Pesquera, the industrial fishing division of the Gildemeister interests. This company's establishment at Chancay, where it has an integrated operation, has already been described.

Three additional operations are in the reduction field. Two of these were under construction when *Pacific Fisherman* visited Peru, but were scheduled for completion and operation before the end of 1957. These plants are at Huarmey and Chimbote, the latter being particularly notable because of the great pier incorporated in the development.

There, under Jaime Besadre as district superintendent, a 600′ pier was under construction into Chimbote Bay, with a modern reduction plant on shore adjoining. The new pier was being equipped with three fish pumps, one serving the Maritima Pesquera plant and the other two delivering fish on a custom toll basis to two neighboring reduction plants owned by other interests.

The Gildemeister reduction plant at Casma is a remarkable establishment in its equipment and the way that equipment is cared for. Here is the prototype of the new Gildemeister enterprises at Huarmey and Chimbote. Each will improve on Casma, but Casma gave them a pattern.

Casma is situated in a well-protected bay, so it can maintain a pier for the accommodation and discharge of the 14 Caterpillar-powered fishing vessels which catch its anchovies. This pier is equipped with a fish pump for discharging anchovies, and delivering them to the plant ashore through pipeline. As few of the fishing boats are equipped with pumps adequate for flooding the hold to facilitate pump-

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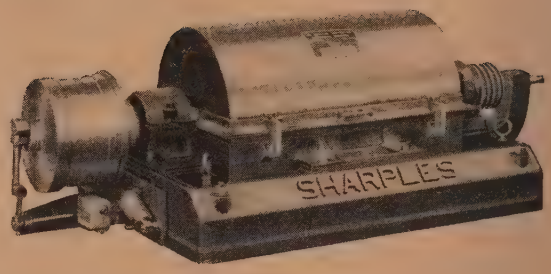

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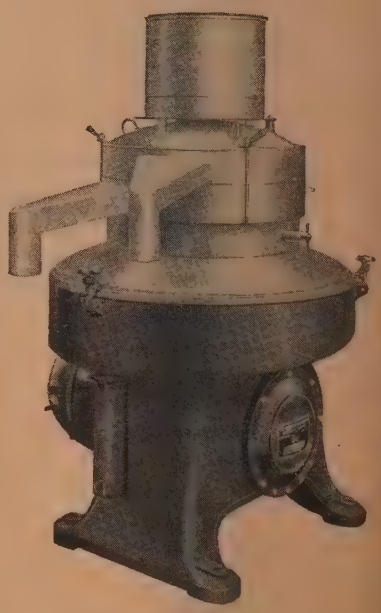

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ing the fish, the pierhead fish pump performs this function as well, delivering water into the boat and then pumping out fish and water together and piping them to the plant.

The Casma plant will reduce from 150 to 200 tons of anchovies a day in a Schlotterhose unit of German manufacture. The press cake goes into a three-pass steam-jacketed Schlotterhose dryer where it is dried at low temperature, producing meal exceptionally light in color and said to be high in protein digestibility.

Stickwater from the press passes first to a Westphalia rougher centrifuge of German manufacture, and its oil product to a pair of De Laval centrifuges for finishing.

Power for the Casma plant has some unusual aspects. Primary source is a Spillingwerke steam turbine, driving a Hansa 240 kva. generator. Both of these units are of German manufacture. Low pressure steam from the turbine is used in the cooker of the reduction unit, and also to heat the steam-jacketed dryer.

Stand-by power, provided for periods when the cooker and dryer are not making demand for steam, is a Caterpillar D326 Series F diesel-generator set.

Miguel Mattos was administrator of the Casma plant when it was visited by *Pacific Fisherman* and found to be not only well equipped but very well cared for.

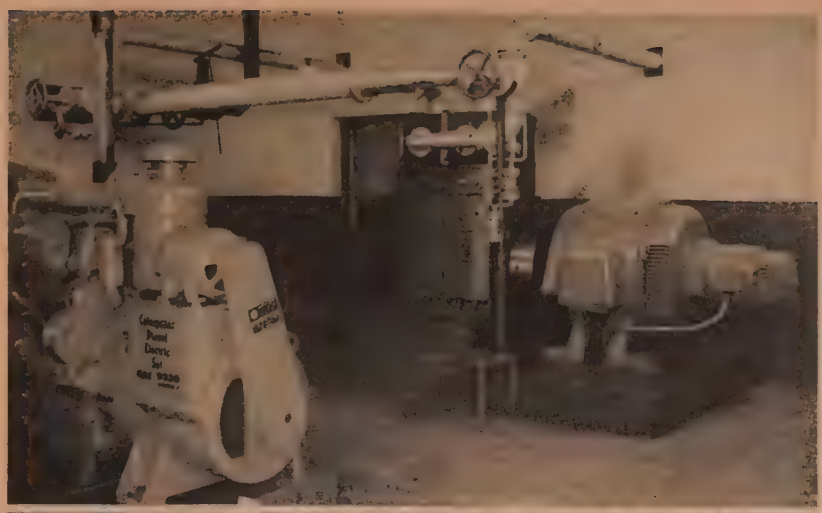
Bibaco, S.A.

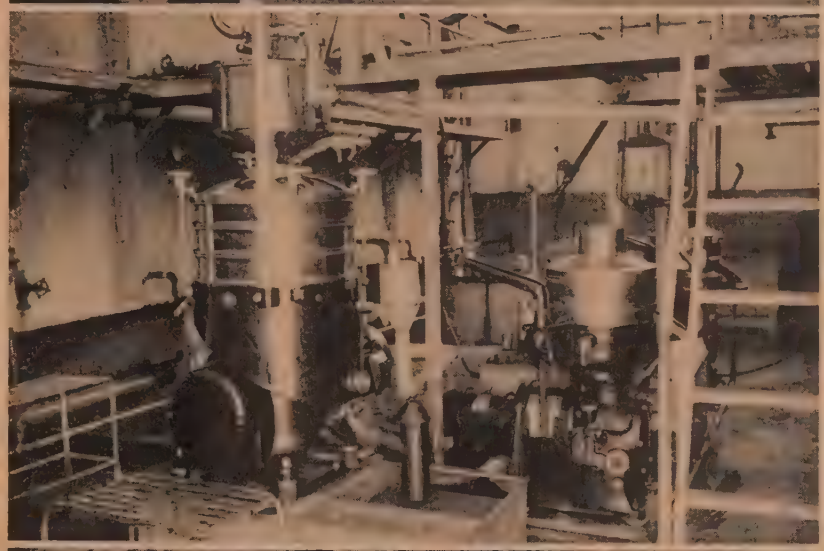
• The Bibaco plant at Chimbote is another Schlotterhose installation, in this case with a double-run steam-jacketed dryer which dries the meal in a period of 1½ hours without temperature at any time rising above 80° C. Capacity of this Schlotterhose unit was only from two to 2.5 tons per hour.

To be installed at Bibaco before the end of the year is an Atlas unit of Danish manufacture, which will raise the daily capacity of the plant by an additional 100 per 24 hours. This Atlas plant includes an indirect steam cooker in which the steam chamber jackets completely the tube through which the fish is moved by a steam-heated rotor; a double-screw press with its slow, hard pressure; a steam tube rotary drier, all equipped with Atlas vertical disintegrator, mills and pneumatic dry meal transfer.

Pesquera Humboldt

• This new straight reduction plant has a number of noteworthy features, but none more interesting or important than its introduction of the "Monterey type" fish pump, which draws the





Exceptional Reduction equipment in the Gildemeister anchovy plant at Casma. **Upper**—Prime power is provided by a Spillingwerke (German) steam turbine, right center, driving a generator, with exhaust steam heating the cooker and drier in the reduction process. Caterpillar diesel-electric stand-by unit in left foreground is the only non-German equipment noted in the plant. **Middle**—Westphalia centrifuges, rougher and polishers, recover and refine Casma's fish oil. Note admirable "housekeeping." **Lower**—Schlotterhose cooker-and-press equipment, center, with Schlotterhose three stage steam-jacketed drier on the left.

Gildemeister reduction plant at Casma is a notable specialized installation on which the later plants at Huamey and Chimbote were developed. It is Schlotterhose-equipped.

fish from a floating hopper anchored off the beach and delivers them to the plant through a submerged pipeline. The plant is located on a minor bay a short distance south of Chimbote. Its fishing boats lie alongside the floating perforated hopper and brail their anchovies into it.

The plant is situated on an open beach with partial protection from neighboring headlands. When visited it was necessary to haul fresh water for steam purpose by means of truck. This was stored in a concrete tank. With the completion of another plant in the vicinity it was planned to drill a well to serve both businesses.

Manager of Humboldt is Luis Banchero. Business headquarters are at Carabaya 831, Of. 406, Lima. Superintendent in charge of plant operation is Alfonso Puga, a graduate chemical engineer.

The installation is entirely in the open air, the machinery being surrounded by a high wall to protect it from blown sand.

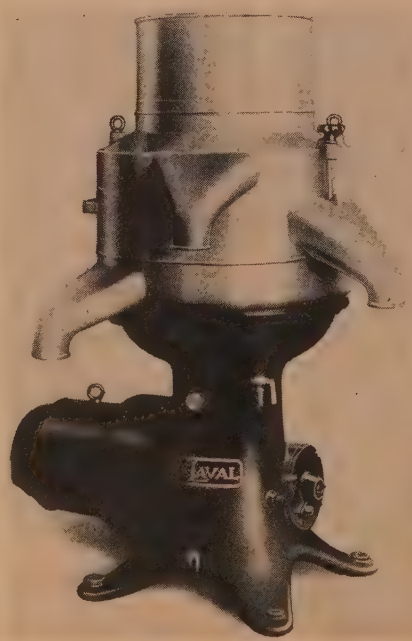
The fish pump pipeline discharges over a dewatering screen, from which the fish are weighed and discharged to a pit, from which they are raised by a helical elevating conveyor and divided between the cookers of two California Press Manufacturing Co. cookers and presses. This equipment has a combined hourly capacity of from 10 to 12 tons. From the two presses the cake is broken in a Reitz disintegrator and then dried in a recycling air-lift dryer, the pneumatically-removed meal from which is ground in a hammermill and then delivered by air duct to the sacking units.

Stickwater is passed over a foots recovery screen and press, solids going into the press cake and the liquid to a pair of DeLaval centrifugals. Primary power source for the plant is the Chimbote system, but stand-by power is provided by a Caterpillar D337 diesel driving a 150 kw. generator. Steam for cooking and other purposes is provided by a Cleaver-Brooks steam generator.

Cia. Ballenera del Norte

• Newest whaling venture in all the Americas is Cia. Ballenera del Norte, established in 1957 at Tierra Colorado — Red Rock — a few miles from the port of Paita in northern Peru, only five degrees south of the Equator.

This enterprise is shared jointly by Archer-Daniels-Midland Company of



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Westgate in Peru — Full-face view of Frigorifico Paita S.A. main plant, with fishing boats beached for repairs. Offices and warehouse occupy this face of the structure, with the freezer and cold storage behind and the cannery in a separate building further back, at the foot of the hill.

Minneapolis and Peruvian interests. Management is in the hands of James S. Russell with an office in Lima.

The whaling station is served by three Norwegian-built killer boats, commanded by Norwegian masters and manned with Peruvian crews. They are named *Don Thomas, Don Juan* and *Don Cristobal* for officers of the company.

Established primarily for the processing of sperm whales, which appear to congregate along the coast of Peru to feed on the giant squid, the station was constructed to the highest standards with lavish use of concrete, one of the most notable plant piers in all Peru, and a battery of six great steel tanks for the oil fuel required and the whale oils produced.

Equipment of Ballenera del Norte is largely of European manufacture, with interesting international variety. Some of it is Norwegian, as are the killer craft; the two boilers, weighing 25 tons each, are British; the three digesters where the meat and blubber is cooked under pressure came from Germany and weigh 30 tons each. The sea water distillation unit which furnishes the plant with much of its fresh water is of Danish manufacture.

Fish Freezing Plants

• Primary fish freezing plants—those established fundamentally for the preservation of fish by freezing, and not operating as auxiliary to or associated with canneries—are all concentrated in the northernmost sector of the Peruvian coast, because there the tuna and swordfish, which hold front rank among Peru's fish used for freezing, are found in greatest abundance. Lately these ventures have found a third product as a fishery for large shrimp has developed in Peruvian waters adjacent to the boundary with Ecuador.

Frigorifico Paita, S.A.

• There are actually two freezers, a reduction plant and a cannery in the Frigorifico Paita, or "Fripsa", operations, but the company's activities are dealt with under the head of freezing plants instead of intergrated canneries because their primary function is the freezing of tuna and tuna loins for export to the United States.

The company is a subsidiary of the Westgate California Corporation of San Diego, and is responsible in the table of organization to National Marine Terminal, another subsidiary, whose general management is vested in Capt. John Goodwin with headquarters in San Diego.

Manager of these companies' operations in South America is John Day, who has headquarters in Lima, Edificio Atlas, 10° Piso.

• Frispa's operations center at Paita, the most westerly of all Peruvian fishing ports, situated on the extreme northerly nose of the coast, where the configuration of the land, plus the east-moving Equatorial Counter Current, tends to turn the Peruvian Current strongly out to sea. The shear zone between these two counter-moving current develops a condition which is specially attractive to swordfish and tuna.

At Paita itself is the Fripsa operations office, main freezing and storage plant, pier and repair base, supplies and stores warehouse, and a cannery. A few miles away, in a bay with moderate protection, is Tierra Colorado, commonly known as "Red Rock" or "Norpac".

The Paita operation was originally established by the Wilbur-Ellis Company. The Red Rock or Norpac freezer was built by the Sun Pacific, Inc., interests of San Diego, headed by Jack Crivello, as a shore base for its fleet of tuna vessels then operating off northern Peru.

Subsequently the Westgate-California interests acquired half interest in Frigorifico Paita, then the Norpac establishment, and finally the remaining Wilbur-Ellis interest in Fripsa. Of their former holdings in Paita the Wilbur-Ellis interests now retain only a repair base for servicing its northern fleet based at Mancora, further north along the coast.

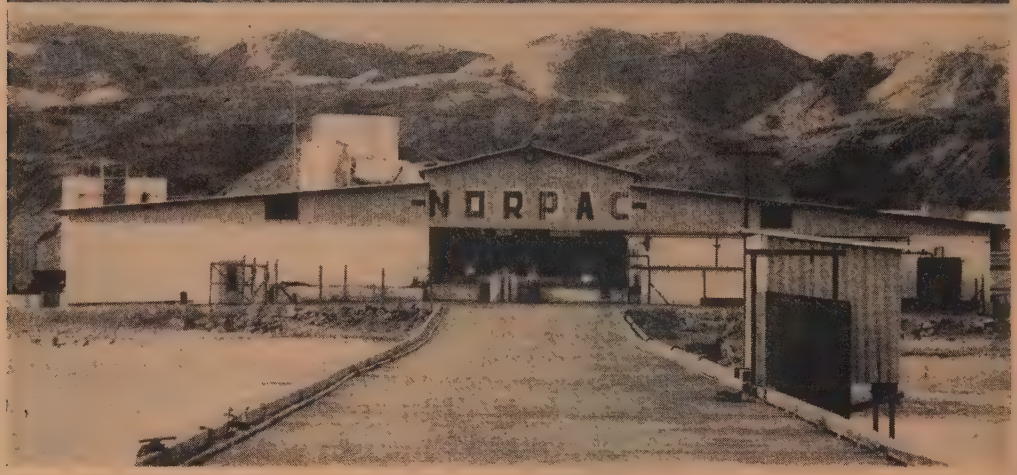
Red Rock

• The Norpac plant at Red Rock serves primarily as a stand-by and auxiliary to Paita in the Fripsa operation. To its primary function of a freezer there was added during the latter part of 1957 a reduction plant equipped with machinery transferred from California, and which was not yet being installed when the plant was visited.

The Norpac freezer is a well-planned structure for tropical operations, the low, one-story building being divided into three functional sections. Fish receiving and preparing, engines, compressors and ice tank are all in the central section. Sharp rooms and storage compartments are in the wing sections. The plant is equipped with an adequate dock at which small craft may lie under favorable conditions of the sea.

At the time the plant was visited the principal fish being handled were the catches of a fleet of 10 trawlers each 46′ in length, fishing to supply the fresh fish requirements of the several small cities of northern Peru within trucking distance of Paita. These fish were distributed by a fleet of refrigerated trucks which get their ice at the plant.

As there is no water supply at Red Rock, and there is a substantial demand for ice making and fish glazing, the plant is equipped with two Cleaver-Brooks compression stills which produce combined 3,500 gals. of fresh water daily.



Tierra Colorado or "Red Rock"

Two views of this freezer and cold storage plant of "Fripsa" near Paita. Originally established by Jack Crivello, the plant is now part of the Westgate-California operations.

Power for the plant is provided by four General Motors diesels, each driving a 125 kva. generator. Refrigeration equipment consists of two Lipman, one York and one Kohlenberger compressors.

Fripsa at Paita

• Frigorifico Paita S.A. operations differ from any other in Peru in a number of respects, of which perhaps the most significant is that they derive their supplies of fish from tuna clippers fishing with live bait. There are other ventures in Peru which freeze tuna, both with the exception of Fripsa they depend primarily upon seiners. At Paita bait boats are the prime source of supply.

Live bait is secured at a number of points along the coast, but largely from the Bay of Sechura, a short distance south of Paita. Skipjack dominate in the landings at Paita, with a moderate percentage of Yellowfin. There are also swordfish, taken by a fleet of harpooners.

The Fripsa plant involves a cold storage with capacity for 1,500 tons of frozen fish, a small one-line cannery, extensive maintenance and repair provisions, such as a haul-out beach, machine shop, foundry, net loft, and all facilities necessary for operation in a remote region save ways for hauling out the larger vessels serving the enterprise .

Power for Fripsa is provided by three Caterpillar and one International diesel. There are three large Frick compressors and two smaller Bakers. The cannery is equipped with an Angelus seamer for halves. When visited canning was confined to packing the red meat produced in preparing tuna loins as "Purr" cat food, for the United States market.

While Fripsa freezes round Yellowfin tuna for shipment to San Diego, a substantial part of its activity is devoted to preparing frozen Skipjack loins for subsequent canning. This work—save for the freezing of course—is done in the cannery, where the Skipjack are pre-cooked, cooled, and then the loins are prepared just as though they were to be canned.

The prepared loins are then packed carefully in freezer pans, the lengths being trimmed to provide the best fit. A little water is placed in the bottom of the pan before the loins are skilfully fitted in to give a solid pack. The pans are never filled to the brim, and are immediately removed to the sharp freezers.

When freezing of the pans has been completed, they are removed from the sharp rooms and the pans are filled with cold water, which quickly freezes to give ice-protected block of cooked, frozen fillets. Removed from the pan, the block is wrapped in heavy kraft paper and stored to await shipment to San Diego by refrigerated ocean carrier. In California the blocks are thawed and the loins fed into a Carruthers Pak-Shaper for filling into cans.

At Paita Fripsa was working with another development at the time the plant was visited. Instead of the loins being panned for freezing, they were being fed into a Pak-Shaper from which the can-filling unit had been removed. The machine extrudes a shaped cylinder of fish into a plastic tube 20" in length. As the tube is filled the cylinder of fish is cut and another tube presented. These filled tubes are frozen in the sharp room, then dipped to free the cylinder of fish, which is glazed in fresh water, wrapped in heavy waxed kraft paper, and packed in cases for shipment to San Diego.

There it is planned to cut the cylinders into can-height sections with a machine developed for slicing frozen meat, placing the squat cylindrical sections unthawed in tuna cans for salting, oiling, sealing and retorting.

Marinos Refrigerados, S.A.

• Most northerly packing plant — freezer, cannery or reduction—on the entire coast of Peru is the 1957-built freezer of Marinos Refrigerados S.A.,

owned by Charles H. Kollmeyer and Anibal Urteaga who have headquarters in Tumbes, Casillo 143. The plant, however, is located a few yards from the beach at Caleta Cruz, primary shrimp-landing point in Peru, where the modern shrimp fleet lies at anchor on the very edge of the grounds trawled.

This plant is soundly-built of concrete and brick, with freezers and storage rooms insulated with rice hulls and charcoal, materials available in Peru without cost, and reasonably satisfactory as insulation if an effective moisture barrier is established and maintained.

The plant is refrigerated with two 6¼ by 6¼ Baker ice machines, direct driven by German M.W.M. diesels.

Interamerica de Navegacion y Negocios, S.A.

• Cesar Vallarino is owner of this operation, which maintains freezing barges served by refrigerated carriers off the coast of northern Peru at Mancora and Zorritos, with headquarters office in Callao at Av. Paz. Soldan 131.

On the beach at Mancora the company maintains warehouses and net facilities, while its freezing barge is anchored offshore. Perhaps the primary element in the Vallarino floating equipment is the freezership *Spicewood*, which had previous been employed on transporting frozen tuna by the Van Camp Sea Food Co., Wilbur-Ellis Company and Westgate-California Tuna Packing Co. The Vallarino fleet also includes *Marylyn*, a sistership of *Spicewood*.

Cia. Pesquera Mancora, S.A.

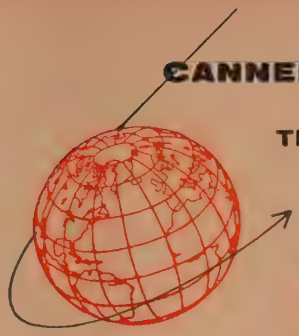
• Rafael Grana is the operator of this enterprise, which resembles the Vallarino business somewhat in its concept and equipment. A freezer barge off the beach at Mancora, served by the carrier *Bonito*, with the freezer *Rosa Angelia* at Zorritos provide an operation which dispatches substantial quantities of frozen tuna and swordfish to the United States.

Company headquarters are maintained in Lima, where Mr. Grana has offices in Edificio Ostolaza, 5th floor.

Cia. de Negocios de Ultramar, S.A.

• "Conulsa" is the universally used name for Cia. de Negocios de Ultramar, S.A. — High Seas Trading Co., Inc.—in the fishing industry of Peru. The company is owned by associates of Wilbur-Ellis Peruana S.A.

Operations center at Mancora, under the management of Howard Riley.



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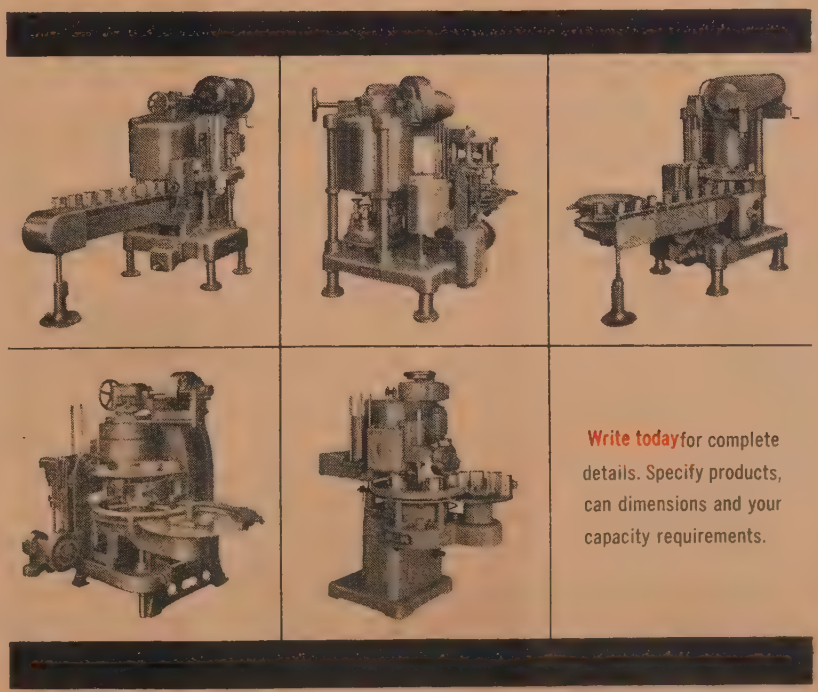

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Most Northerly fishery plant in Peru is this shrimp freezer of Marinos Refrigerados S.A. at Caleta Cruz, the center of the country's growing shrimp fishery. It is located on a shallow bay giving onto the Gulf of Guayaquil.

with general management vested in F. D. Wyatt at the Wilbur-Ellis Peruana headquarters in Lima, Carabaya 831, Of. 406.

At Mancora, Conulsa maintains a freezing and cold storage plant ashore, complete with warehouses, maintenance shops, net floor, radio communications, staff quarters and guest house.

In addition the freezing barge *Moquegua* is anchored offshore, served and supplemented by the freezership and transporter *Ayacucho* and the refrigerated carrier *Kon-Tiki*. The *Moquegua* was originally a refrigerated barge for the U.S. Army. It freezes fish at 0° F. and stores 250 tons. Power is derived from five Lister diesels, two driving generators and three direct-connected to Baker compressors.

Caleta Cruz shrimp operators, Charles H. Kollmeyer, left, and Anibal Urteaga, partners in Marinos Refrigerados S.A., which built a shrimp freezer in 1957 at this most northerly fishery on the coast of Peru.

• Necessity for the freezerships and barges in the operations in the Mancora area lies in the fact that nowhere is there a protected harbor, and nowhere has it thus far proved possible to build and hold a pier where boats can discharge and lighters can load.

Anything which comes ashore at Mancora must come through the surf on balsa rafts or in broad-beamed skiffs. Thus the freezing vessels are the key factors in the Mancora operation, with the shore plant used essentially for overflow storage. However, in the past year the packing and freezing of shrimp, which are brought overland by truck from Conulsa's delivery station at Caleta Cruz, some 35 miles further up the coast, has given the shore plant important new duty.

All tuna fishing for Conulsa is done by purse seines, most of the boats being small, and many of them built to plans purchased by Wilbur-Ellis Co. years ago from H. C. Hanson, Seattle naval architect. The Callao shipyards where the craft were built made some modifications, so outwardly the boats show many distinc-

tions, but they are fundamentally the same sound craft. Most of them were originally powered with gas engines, but these have gradually been replaced with diesels—mostly General Motors.

• Shrimp operations are the newest development for Conulsa, and are actually a Peruvian development of the Ecuadorean business which got a start earlier in the Gulf of Guayaquil, and particularly at Manta, Ecuador.

The big shrimp, and they are *big* among shrimp anywhere, are taken by trawling in relatively shallow water in the area where the Gulf of Guayaquil provides the largest opening in the compact coast of South America above southern Chile. Whether Peru's share of this fishery can ever be considerable is a matter of some doubt, she has an agreement with Ecuador and Chile which recognizes special rights for a coastal state in the high seas off its shores, and up to boundaries projected seaward. Application of this rule limits Peruvian shrimping in its northern boundary waters to a relatively small portion of the area where the shrimp are found.

Men of Mancora—Manuela Alacon, left is fleet boss and A. Mendoza is purchasing and inventory agent in the Conulsa operation.

As the shrimp are sorted and headed aboard the trawlers they are packed in ice in large insulated boxes. At Caleta Cruz these heavy boxes must be gotten into skiffs and rowed through the surf to the beach. Here they are placed on motor trucks and hurried to Mancora, where the shrimp are carefully washed, graded for size and uniformity of color, packed in 5-lb. boxes and sharp frozen. The trucks returning to Caleta Cruz bring a number of the insulated containers filled with ice.

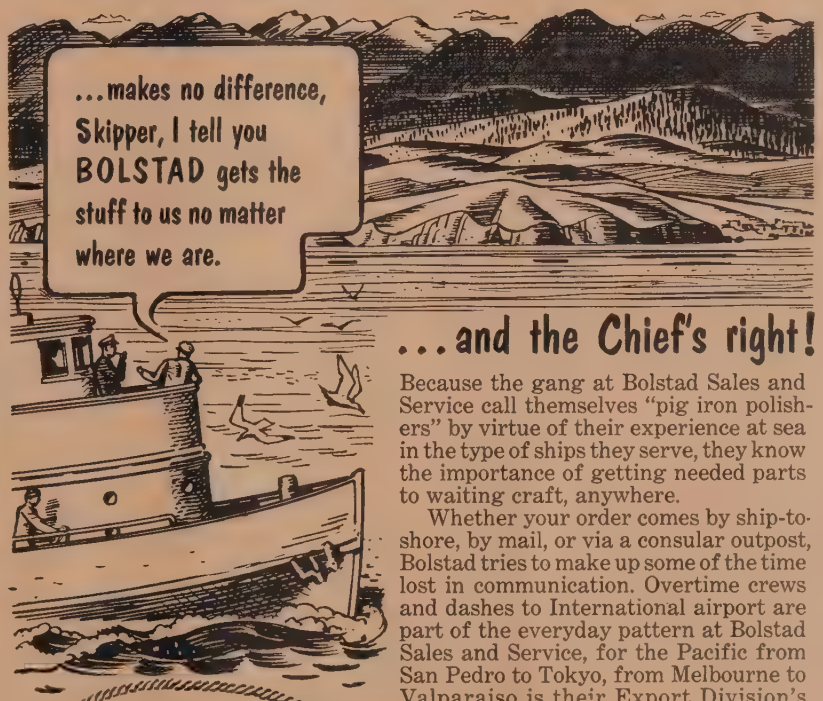
The largest shrimp, grading around eight to the pound, are carefully sorted for uniform color and are packed at Conulsa under "Southern Seas" brand. The smaller shrimp—and these fall within the 12-15-count which is considered very large in most shrimp fisheries are packed unlabelled for the institutional trade.

Remote as it is, on the extreme north coast of Peru, hard-by the boundary with Ecuador, and barely below the Equator, Mancora carries a challenge to any operator. Howard Riley, man-in-charge, has followed the sea from Southern California to the deserts of Arabia and Northern Peru. Under him is a smooth-working, hard-working staff: Manuela Alarcon is fleet boss; A. Mendoza handles purchasing and stores inventory; Karl Just, a German, is master mechanic; S. Shibata, a Japanese, is net boss.

• The seas of northernmost Peru are fertile almost beyond belief, producing not only a multitude of fish, and also many more varieties than the ocean further south. But the coast that runs from Paita to Talara, Mancora, Zorritos and Caleta Cruz is a cruel and bitter land, challenging man's courage, ingenuity, determination, and willingness to risk.

In this near neighborhood the white race established its first foothold on the Pacific Coast of South America, for it was Tumbes, just around the point from Caleta Cruz, that Pizzaro seized his beachhead for the Conquest of Peru.

PERU, CHILE, SOUTH PACIFIC...



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Chapter XII.

Whither the Fisheries of Peru?

When? How? How Far?

• Whither the fisheries of Peru?

Where are these new forces in a world industry going? And *when?*

How are they going? And *how far?*

These are natural questions at the conclusion of a study and analysis of an industrial phenomenon, the rise within a dozen years of modern mechanization and general utilization of a vast, rich natural resource which Man had ignored since the dawn of history in the Western Hemisphere.

When the facts of this rise are studied, what do they tell? Where do they point?

• Today the fisheries of Peru stand at a time for testing.

Markets for their prime product, canned bonito, are impaired; for they share a weakness manifest in the tuna trade in the United States, Great Britain and Japan.

In the United States market bonito is under the pressure of low prices for canned tuna, and handicapped by bonito's lack of identity as a canned fish of merit in its own right.

In its other great market — the United Kingdom — Peru's goods are face-to-face with a new form of competition. The production of a nation which makes a fetish of free enterprise, Peruvian tuna must compete in Britain with the pack of a controlled and carteled industry—that of Japan, the greatest fishing nation in the world.

• Success in such a situation demands courage, shrewd business thinking, determination, and adequate finance. Of these qualities the Peruvian fishing may lack something in financial strength so far as some of the individual companies are concerned, but the national economy ranks with the very soundest in South America.

• Most prosperous element in the Peruvian fisheries today is that which manufactures fish meal and oil from anchovies and other fish not used for human food to significant extent.

Paradoxically, this is the one element of the fisheries on which the government has laid the hand of control. Prosperity of meal and oil manufacture, and its tendency to grow, is the cause of the restriction, not the result of it.

Presently the Peruvian government limits reduction plants to those authorized and completed by the end of 1957. The measure was proclaimed until such time as science could determine the amount of anchovies which could be used for manufacturing industrial products — employed largely for feeding farm animals — without endangering the food supply of the sea birds which yield guano, an agricultural fertilizer.

Fortunately the means for such scientific determination is at hand, in the Council for Hydrobiological Research, which in 1957 began a research enterprise financed by the license fees paid by American tunamen for fishing privileges off the coast of Peru.

So much for the present.

What of the Future?

• Objective consideration of the fisheries of Peru as they may be projected in the future brings into bold relief a number of factors which of certainty do much to focus that projection. The future itself will find other influences, for good or ill; but today these at least can be counted upon as sure to bear a large part in shaping tomorrow for the fisheries of Peru.

• *Markets* — These are paramount; and they must be built and maintained with vision and with skill.

In the United Kingdom Peruvian goods now face formidable competition in a market which they hitherto have dominated; and whose whole taste for tuna they have developed in a decade.

In the United States, Peruvian bonito's largest present market, it suffers from lack of promotion and identity. Bonito as such is almost unknown. While it sells to the extent of several hundred thousands cases annually, it is largely regarded in the United States as a cheaper substitute for tuna; not as a quality canned fish with an identity of its own.

• *Competitive Position* is of particular importance in so close a race as that shaping up in the contest for the world's canned tuna and bonito business. Peru has a strong position in the two leading markets of the world, but her costs have tended to rise threateningly above the level which made achievement of that strong position possible.

• *Maintained Standards* of quality and fiscal policy—together with comparatively low costs — have helped Peruvian canned fish to a position of preferment in foreign markets. Any relaxing of these standards would have tragic consequences.

• *Physical facilities* in the industrial fisheries of Peru are adequate, and even admirable, so far as packing is concerned. From the time the fish

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Mr. James R. Townsend, Fishery Consultant with headquarters in San Francisco, California, is technical advisor to fishing companies in various countries while also supervising netting sales for world-wide Wilbur-Ellis Company. With over 30 years experience with fishing gear of all types he says: "I have seen MARLON netting being manufactured at Momoi's factory in Japan with the quality and workmanship meeting severe and rigid specifications demanded by purchasers. I have also seen MARLON netting in use under extremely rugged fishing conditions in many parts of the world and examined MARLON after several years of use fishing in Peru, South Africa, Mexico and California. I am satisfied both with fishability and long-lasting qualities of MARLON when used in areas where formerly the netting deterioriated very rapidly. It is my opinion that MARLON gives better value than any other synthetic netting being offered and have no hesitation in recommending it for use in seine nets wherever used throughout the world."

Captain Casimiro Mena, top flight skipper of forty-two footer **Bibaco No.** 1 of Chimbote, Peru, says: "La red de MARLON es buena porque resiste el peso de muchas toneladas de anchoveta y su color no se destine facilmente. Tambien tiene la ventaja de no podrirse con la sangre del pescado. La red de MARLON es liviana y facilita el trabajo de levantarla cuando esta con pesca. Para rememdar la red de MARLON, los nudos no se resbalan de las mallas, en cambio en nylon si sucede esto. Esta red a pescado 2,750 toneladas en termino y de ano y medio, y es un buen resultado para una lancha de este tamano, y la red sigue en buenas condiciones de pesca."

Marlon Menhaden Seine ★ Marlon Mackerel Seine ★ Marlon Herring Seine
Marlon Tuna Seine ★ Marlon Salmon Seine ★ Marlon Sardine Seine
Marlon Anchovy Seine ★ Marlon Shrimp Trawl

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Lima Outlook—Modern buildings seen from the offices of Star-Kist Peruana, where George Gligo, manager, shown here in silhouette, looks out on the capital Pizzaro founded.

enter the plants, canneries, reduction or freezing, equipment and methods conform broadly to the standards of modern fisheries throughout the world.

In the field of fishing, vessels, gear and equipment; in handling, by piers and pumps; in maintenance of floating equipment, there is much room for improvement.

This statement must be hedged with respect to a number of fishing vessels which have been brought from North America and Europe, and which may be regarded as forerunners of the future fleet.

Many boats, as well as better boats, will be required.

But however good they may be, however large, however new, the vessels will require maintenance; and lack of facilities for vessel maintenance is one of the prime factors contributing to Peru's need for a renewed fleet. The smallest vessels can be hauled out and serviced at many of the canneries, true; but means for maintaining major fishermen are almost wholly lacking.

Here is a very real need.

Fish handling is particularly a problem on the coast of Peru, where adequate piers and ports are rare. This imposes necessity for much manhandling, much trucking. Labor is cheap, admittedly, but there are other costs which count, in lost fish and lower recovery.

• *Gear and equipment* are sure to move ahead, and the Peruvian fisherman has shown himself quick to appreciate the possibilities of modern equipment in his ready acceptance of marlon and nylon netting and plastic net floats.

The men who have seen the advantage of synthetic netting for anchovy seines will recognize the opportunities in bonito gillnets as well, and in the large field of tuna and bonito purse seines.

Power blocks already have made a beginning, and seem sure to sweep the fishery as boats are capable of mounting them.

Electronic instruments are harder to understand, and may be slower in coming to Peru, but there are few informed fleet operators who do not expect in a few years to see many boats equipped with radiophones, echo sounders, and the other electronic instruments which make fishing more productive today.

• *Research*, already begun, has a rich opportunity in its service to the future, for it can study fisheries which are in their very beginnings, and with populations in healthy, undepleted condition. Working in such a field, science can develop means for determining changes in abundance of stocks and the effect of fishing, to the end that the bonito and anchovy resources may be maintained at maximum sustainable yield; and so a realistic portion of a measured anchovy resource can be utilized in the manner which will give the people of Peru the greatest economic return.

• *Exploration* may go hand-in-hand with research, or it may be the result of venturesome cruising by a curious *patron*.

The Peruvian Current, and the broader seas it borders offer almost unlimited opportunities for exploration. Although they have been sailed by Man for more than 400 years, he has scarcely looked below the surface. That era is ending.

Most of Peru's great catches of bonito and tuna and anchovy are taken within sight of land. Few boats venture as much as 60 miles from shore. How far out does the abundance extend? How rapidly does it decrease? Or does it? How deep does it go? Are there economic populations not now fished beyond the range of the present fleet? Or below its nets? Or requiring others forms of gear?

These are some of the questions which even the smartest fishermen cannot answer today with assurance.

True, American tuna vessels fish today in the area of the Galapagos, but they are 600 miles offshore.

Finally, Peru prepares through its Hydrobiological Council to seek in the sea so close at hand the less obvious riches of the Humboldt Current.

These are waters where once the giants of Exploration sailed — Magellan, Pizzaro, Drake, Darwin, Humboldt himself. Great though they were, they left horizons yet to be explored, horizons below the surface of the sea.

On this note closes *Pacific Fisherman's* report on *The Fisheries of Peru —New Forces in a World Industry*.

• Despite the antiquity of this land, with its civilizations stretching far beyond that of the Inca; despite the ancient history of this South Sea of the Conquistadors, Peru's fisheries are *new* forces in the world industry. Their stature of today was achieved in the span of 12 years. Having seen them rise so fast, who shall say how far they may go?

This is an industry so new that its pioneers are still active in it—and they are young men, as businessmen go.

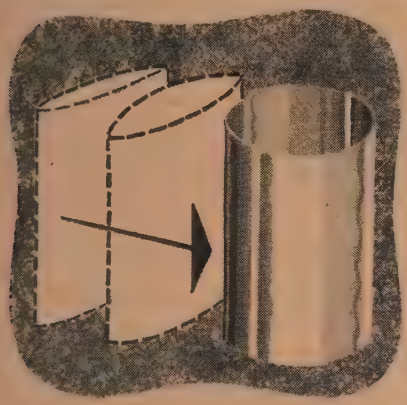
Encouraged by a national policy on international trade and economic soundness, they are developing a resource which no man has measured, and whose limits no scientist has seen.

Nor is this a wasting resource, like the metals of the mountains and the oils of the northern desert. It is a resource which the sun and the sea renew; which man reaps without sowing, cultivating and irrigating.

An "inexhaustible resource"? No; for even the sea can be depleted and its resources exhausted if they are used destructively.

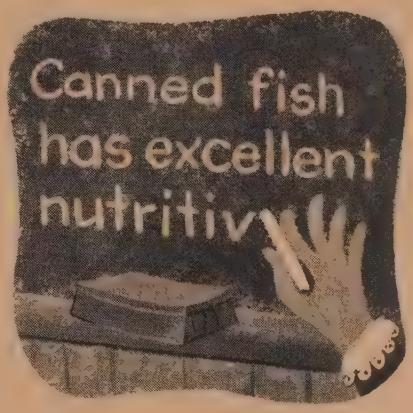
But Peru, with the kind of thinking and foresight which has kept her economy sound, has set in motion the means by which this resource may be measured, its income and outgo gauged, to the end that it may serve the Peruvian people as a permanent source of food and wealth.

With such a potential, protected by such a policy of wise use and sustained yield, the Fisheries of Peru, new forces in a world industry, may well rank among the greatest forces of that industry's future.



Q. Who developed the collapsed can?

A. Canco, of course—to make possible economical shipment of cans to Alaskan salmon canneries!



Q. What has Canco done to promote fish as a major food source?

A. Canco laboratories have publicized excellent nutritive values of canned mackerel, salmon, sardines in oil and in tomato sauce, shrimp, tuna, many others.

Q. Does American Can Company ever work with customers on special projects?

A. Frequently! For example, Canco helped to develop formulas for fish and clam chowders, oyster stew, fish cakes and other specialty products.

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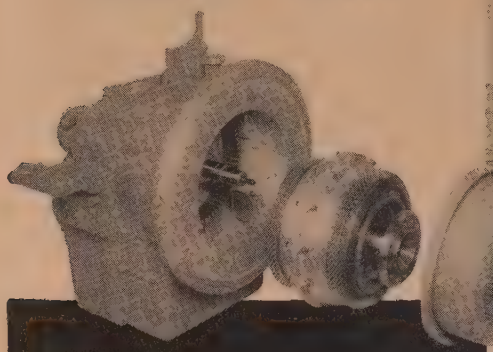

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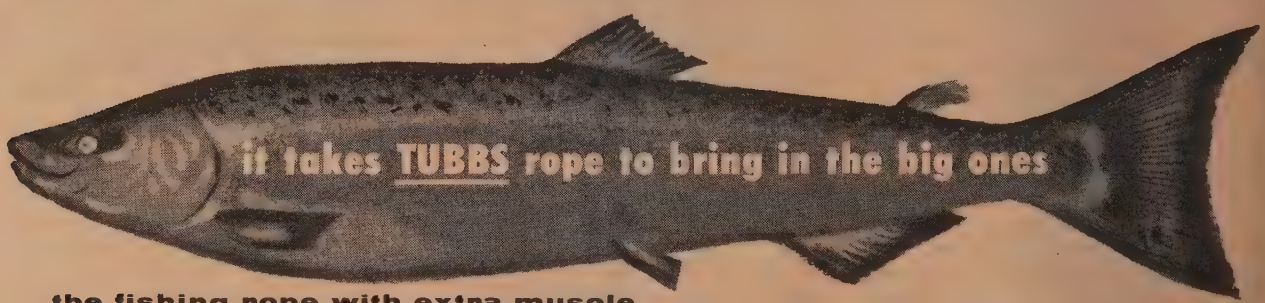

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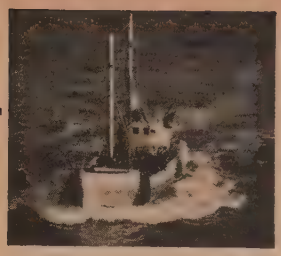

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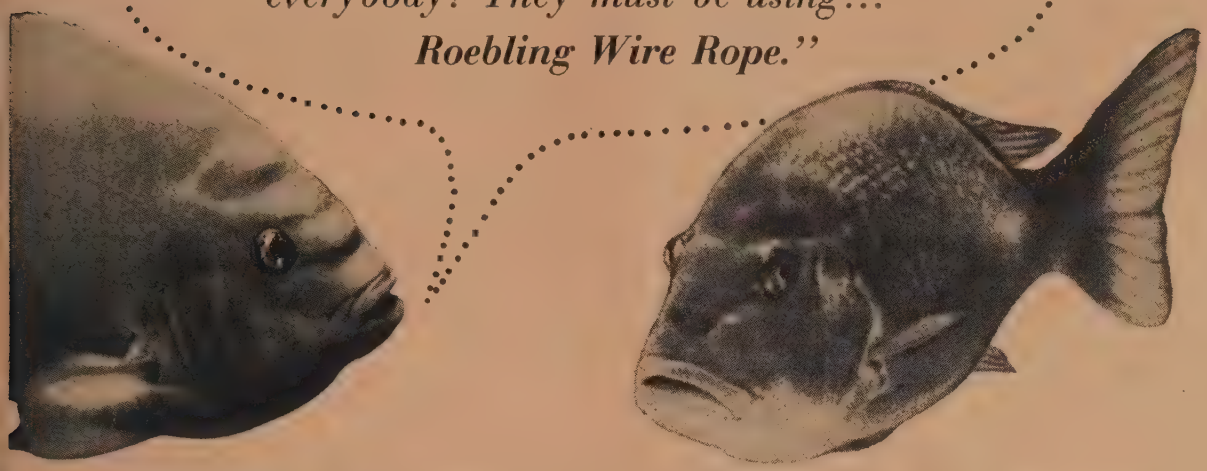

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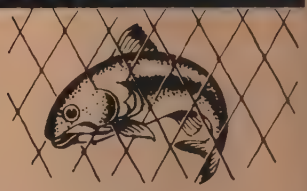

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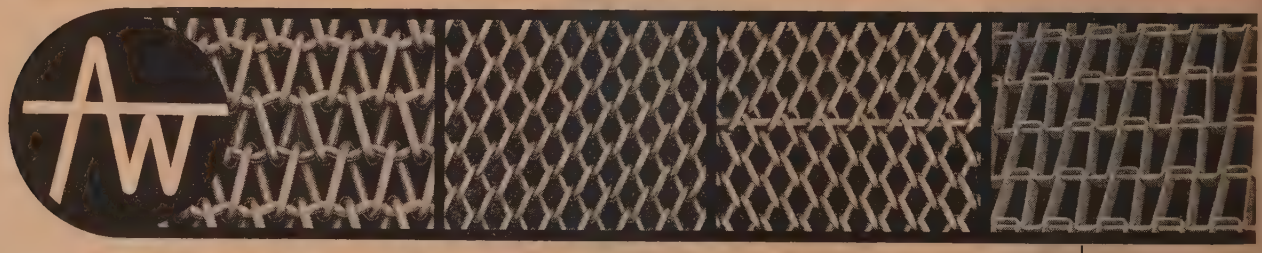

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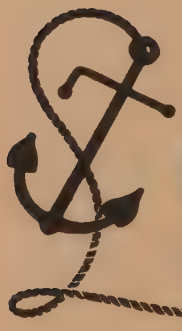

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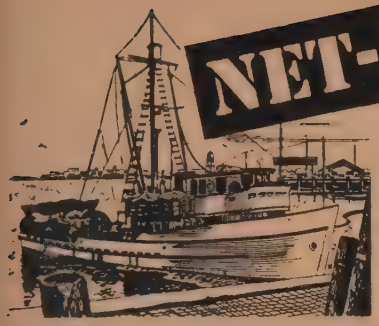

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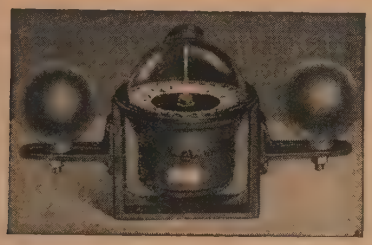

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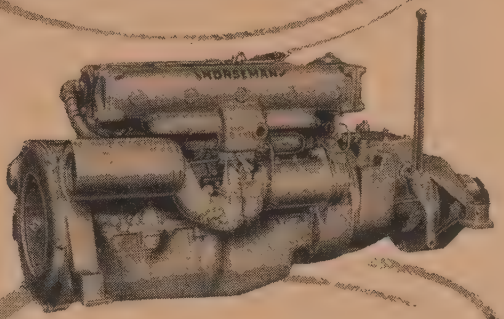

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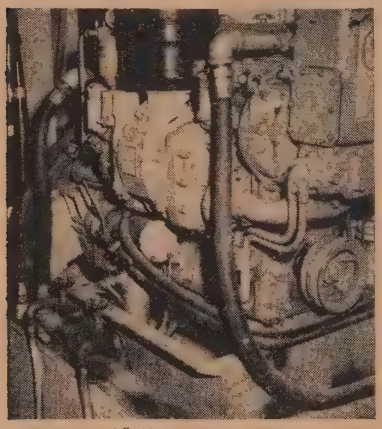

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N C Machinery Awarded Puget Caterpillar Account

N C Machinery Co. has been appointed the Caterpillar dealer for Seattle and nine counties in northwest Washington, Caterpillar Tractor Co. has announced.

The main office of N C Machinery Co. will be located at 4233 West Marginal Way, Seattle. Branch offices will be maintained in Mt. Vernon and Port Angeles.

N C Machinery Co. is a division of Northern Commercial Company which has been the Caterpillar dealer in Alaska and Yukon Territory since 1926. Headed by Volney Richmond, Jr., Northern Commercial Company has offices in the Colman Building, Seattle. N C Marine, another division, has been the dealer for Caterpillar marine engines and electric sets in Western Washington since 1948.

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Of Pacific Fisherman, published monthly except in January when publication is semimonthly at Portland, Oregon, for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:
   Publisher: Wm. B. Freeman, 500 Howard Street, San Francisco 5, California.
   Editor: DeWitt Gilbert, 71 Columbia Street, Seattle 4, Washington.
   Managing editor: None.
   Business manager: C. L. Hillyard, 71 Columbia Street, Seattle 4, Washington.
2. The owners are: Miller Freeman Publications, Incorporated, 500 Howard Street, San Francisco 5, California; Wm. B. Freeman, Miller Freeman, Jr., L. K. Smith, 500 Howard Street, San Francisco 5, California; W. E. Crosby, 71 Columbia Street, Seattle 4, Washington.
3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (None).
4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

Wm. B. Freeman, President
(publisher)

Sworn to and subscribed before me this 1st day of October, 1957.

Barbara M. Hampson,
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San Francisco, California
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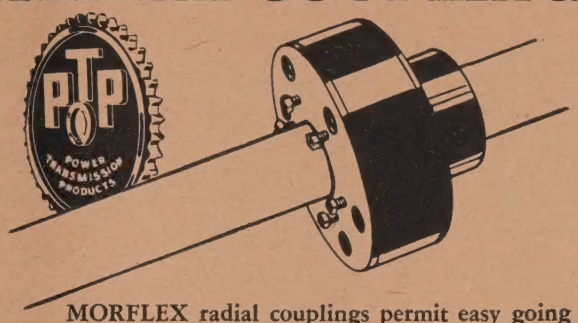

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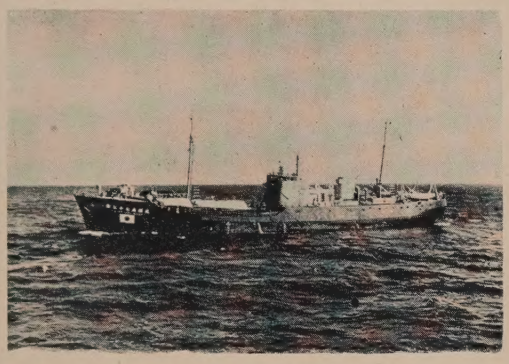

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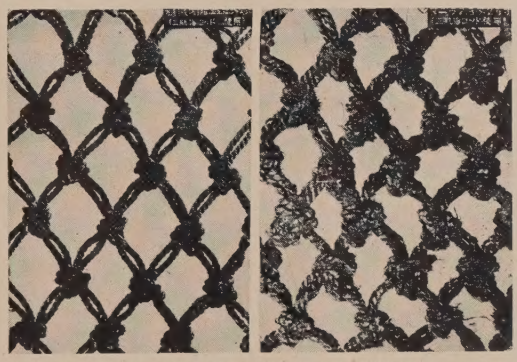

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